AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . .

SEPTEMBER 1, 1952

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A CHILTON PUBLICATION

A century of achievement

Studebaker's big, modern South Bend plant symbolizes the century of growth and achievement which have earned for this company an enviable reputation for high quality products and world-wide recognition as America's fourth largest manufacturer of automobiles.

What's YOUR problem?

Russ Jenkins (left), lubrication specialist from Standard's South Bend office, and Studebaker's Paul Izdepski work closely together to get best results from Standard's fuels and lubricants.

Wherever your plant is situated in the Midwest, there is a Standard lubrication specialist close-at-hand who will work hand-in-hand with you on lubrication problems. Right in your neighborhood, too, you'll find a Standard office and warehouse. It makes immediately available to you a reliable supply of petroleum products. Phone your local Standard office soon, and find how you can profit through Standard's unique industrial lubrication service.

How Standard's lubrication service works for Studebaker

● Look almost anywhere in Studebaker's vast plant at South Bend, Indiana, and you'll see Standard's lubrication service at work.

In one of the many operating departments, the chances are you'll find the Standard lubrication specialist who serves Studebaker. He is assigned to the South Bend area and is close-at-hand to give Studebaker the lubrication engineering assistance they need when they need it.

Almost any day at Studebaker's, you'll see a Standard tank wagon or truck delivering the petroleum products that help keep production rolling. Because these deliveries are made from a nearby Standard warehouse, they are prompt and reliable. Most of the petroleum products used in the Studebaker plant are stocked in this warehouse and are immediately available.

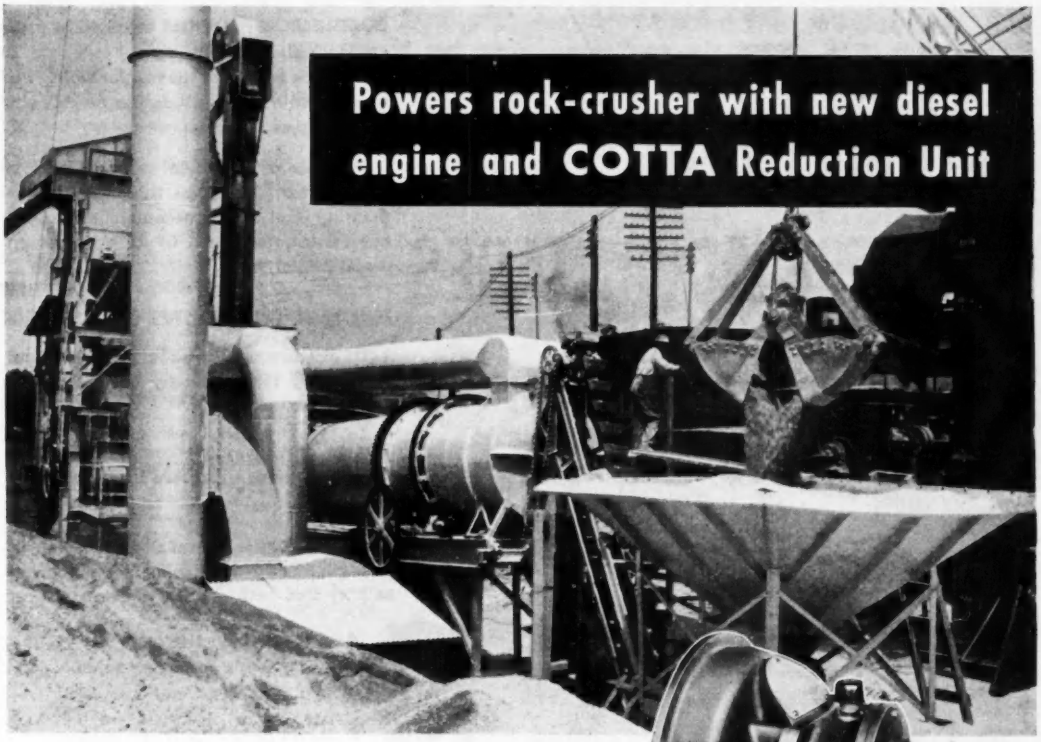
All along Studebaker's assembly and production lines, you'll find Standard Oil products at work. From one of the most complete lines of fuels and lubricants on the market, Studebaker has been able to select the petroleum products that exactly fit its needs.

All of these benefits—expert engineering service, fast and reliable deliveries, a complete line of high quality products—add up to one of the reasons why Studebaker has been a Standard Oil customer for over 50 years. Make Studebaker's experience the basis for putting Standard's lubrication service to work for you. Just phone your local Standard Oil (Ind.) office and ask to have the Standard Oil lubrication specialist in your area call on you.

STANOBAR Grease is used throughout the Studebaker plant for lubrication of bearings in electric motors and oil pumps. Its high stability enables it to provide effective lubrication under a wide variety of operating conditions.

STANWAY Industrial Oil. In many of Studebaker's grinding machines, STANWAY Industrial Oil No. 30H answers a special need by serving both as a hydraulic oil and as a lubricant for ways and guides. The high stability necessary in a hydraulic oil and the oiliness needed in a way lubricant are uniquely combined in STANWAY.

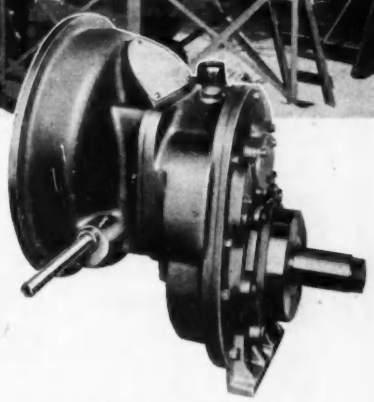
STANDARD OIL COMPANY STANDARD (*Indiana*)



Powers rock-crusher with new diesel engine and COTTA Reduction Unit

One of several in use . . . pleased with performance

Sam Finley, Inc., of Atlanta operates fourteen asphalt plants in the Southeast. Diesel engines, with COTTA Reduction Units, are used in several of the plants to drive pugmills, dryers, or crushers. Most recent application is the powering of a rock crusher in Loganport, Louisiana. Here is another typical application of Cotta Reduction Units — adapting motor speed to the rpm required by operating parts. Do you have a speed reduction problem we can help you solve?



Broad range of ratios
Input torque from 150 to 2000 foot pounds
For use on cranes, shovels, rock crushers, generators, pumps, etc.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA
HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

PRODUCT AND PROCESS ADVANTAGES

increase demands for Ductile Iron

DUCTILE IRON PROVIDES mechanical properties which approach those of cast steel. In addition, it combines the *machinability and wear-resistance* as well as the *fluidity and castability* of cast iron.

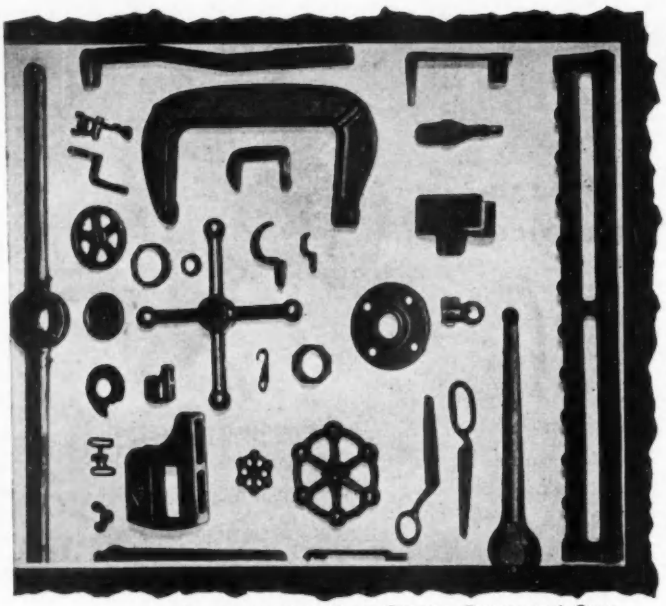
Presence of spheroidal rather than flake graphite not only gives this new material ductility that is unique among cast irons, but contributes much to its other exceptional properties.

REMARKABLE CHARACTERISTICS OF DUCTILE IRON

1. Its elastic modulus, about 25,000,000 psi, is virtually unaffected by composition or thickness...

2. It can provide a chilled, carbidic, abrasion-resistant surface supported by a tough ductile core.

3. As-cast ductile iron of 93,000 psi tensile strength has the same machinability rating as gray iron with a strength of 45,000 psi.



COURTESY OF ACME SHEAR COMPANY, BRIDGEPORT 1, CONN.

4. Annealed ductile iron can be machined at a rate 2 to 3 times that of good quality gray iron.

5. It can be satisfactorily welded.

6. It resists oxidation and growth to an extent never before available in gray iron castings.

7. It can be cast in intricate shapes not normally feasible for cast steel.

AVAILABILITY

Send us details of your prospective uses, so that we may offer a list of sources from some 100 authorized foundries now producing ductile cast iron under patent licenses. Request a list of available publications on ductile iron... mail the coupon now.

Ductile Iron offers excellent castability, high mechanical properties and good machinability. Castings show superior pressure tightness, good elastic modulus and resistance to shock. They range from those weighing a few ounces . . . with sections as thin as one-tenth of an inch . . . to 50-ton anvil blocks with sections 4' thick.

SYMBOL OF INCO SERVICE

The International Nickel Company, Inc.
Dept. 20, 67 Wall Street, New York 5, N. Y.
Please send me a list of publications on: DUCTILE IRON

Name_____ Title_____ Company_____

Address_____

City_____ State_____

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, New York

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

September 1, 1952 — Vol. 107, No. 5

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1901, and the Horseless Age (weekly), founded in 1895, May, 1918.

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Young Welded steel tank and side member radiator for U.S. Army
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Young fixed or removable tube and bundle heat exchangers offer maximum heat transfer per pound of weight.
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Many Young-engineered products are serving the defense effort—helping prime contractors produce equipment that withstands the roughest military usage. We can help you solve your cooling problem.

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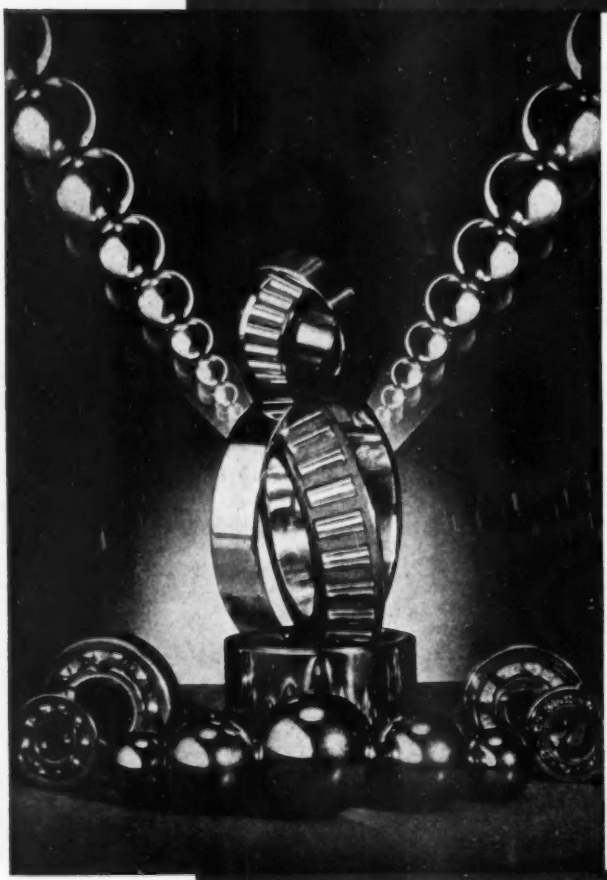
LESS DOWNTIME, MORE PRODUCTION

for Hoover Ball and Bearing Company



As one of America's leading bearing manufacturers, Hoover Ball & Bearing Company, Ann Arbor, Michigan, is always searching for ways to step up production and improve quality. In the course of this never-ending program, Hoover called in a Texaco Lubrication Engineer for consultation.

The Texaco Lubrication Engineer studied thoroughly all the problems involved, then made recommendations which included changing from a competitive grinding oil to a 1-to-50 emulsion of *Texaco Soluble Oil D.* The change was made. Now production is up, costs are down because, with Texaco –

- *machines stay clean*
- *grinding finish has improved*
- *there is no rusting*
- *emulsion filters properly, does not separate, lasts far longer*

Here again is an example of how Texaco quality products plus the know-how of Texaco Lubrication Engineering Service enable all industry to do its machining better, faster, and at lower cost.

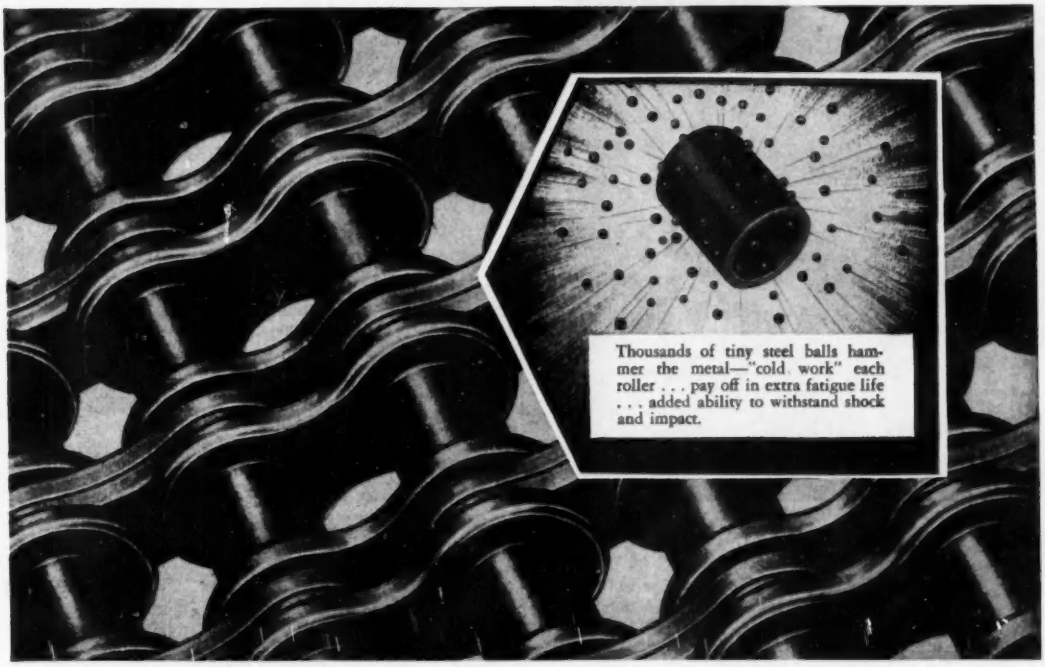
To enjoy these benefits in your plant . . . whatever you are making, wherever located . . . just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

Faithfully yours 50 *for Fifty Years*

TUNE IN: On television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

Get the roller chain that gives you SHOT-PEENED rollers...


Thousands of tiny steel balls hammer the metal—"cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact.

look for the darkened rollers!

THERE are sound reasons for the universal acceptance of Link-Belt Precision Steel Roller Chain. Two of them—shot-peened rollers and Lock-type Bushings—are shown here.

Others include Link-Belt's rigid material selection and controlled heat treating—your assurance of absolute uniformity with no weak members.

Whether it's for drive or conveyor service, you can get the best in roller chain from the complete Link-Belt line—single and multiple widths, in ⅜″ through 3″, and double pitch, 1″ through 3″. Next time you need roller chain, call the Link-Belt office near you.

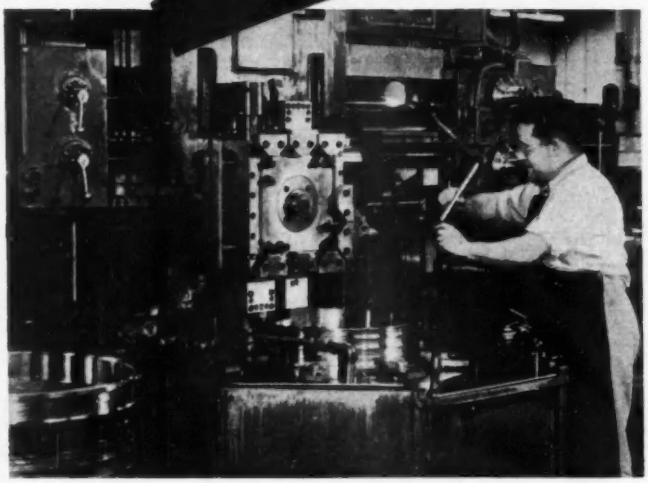
LINK-BELT

PRECISION STEEL ROLLER CHAIN

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,697

Lock-type Bushings increase ability to withstand shock loads

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1″ pitch and double pitch roller chains through 2″ pitch.

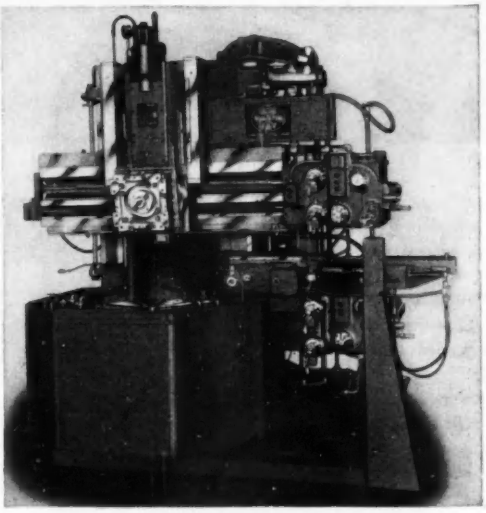


Man-Au-Trol — the word being derived from Manual or Automatic Control — has been found in actual service to possess many unique advantages over many previous methods of machining. Built into the Bullard Vertical Turret Lathe as a basic unit, the combination of this control with a sturdy base machine provides a fine degree of accuracy and a highly efficient production method.

Shortly after the introduction of the Man-Au-Trol Vertical Turret Lathe to the industries it was found that the machine and its tooling provided an economical and highly productive single spindle unit for the larger and heavier types of jobs requiring fine finish and a high degree of repetitive accuracy.

Man-Au-Trol Vertical Turret Lathes working today on high production for the defense program will readily and profitably adapt themselves to the easier pace of normal manufacturing procedures.

Versatility is only one of the many advantages of these machines and it will pay you now and in the future to investigate their possibilities in your plant.



Bullard Man-Au-Trol Vertical Turret Lathe — another step toward Greater Manufacturing Economy. Built in 30-, 36-, 42-, 54-, 64-, and 74-inch sizes.

BULLARD

THE BULLARD COMPANY

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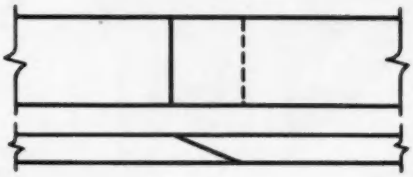
How to remedy common errors in gasket design

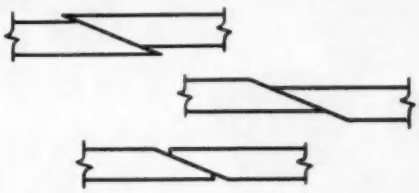
The Fault

Large gaskets made in sections with beveled joints.



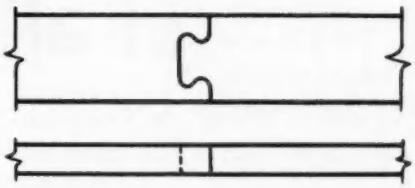
The Reason

Such gaskets require extra skiving and glueing operations. Even then it is difficult to obtain a smooth even joint without steps or transverse grooves.



The Remedy

Use a die-cut dovetail joint.



For additional helpful information on the design and use of gaskets, read "Armstrong's Gasket Materials." This 24-page manual discusses subjects such as designing gaskets to reduce costs . . . designing flanges for efficient sealing . . . the effect of surface condition on gaskets, and many others.

You'll also find up-to-date information on Armstrong's various sealing and friction materials. Included are government and SAE-ASTM specifications. See this manual in Sweet's file for product designers. For a personal copy, write Armstrong Cork Co., Gaskets and Packings Dept., 1509 Arch St., Lancaster, Pa.

ARMSTRONG'S *Gasket Materials*

Eaton Free-Valves

can be applied to engines of all types and sizes

Eaton Free-Valves prevent the formation of stem deposits or uneven seat deposits; prevent local overheating, eliminating the principal causes of guttering; prevent valve stem sticking or scuffing. As a result, Eaton Free-Valves last many times longer. These benefits can usually be applied to an engine without costly design changes. Eaton Free-Valve Kits for motor cars and trucks are available from dealers. Our engineers will be glad to work with you in applying Eaton Free-Valves to your engines.

EATON MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

MACHINES MOUNTED ON Westsorb CAN'T CRAWL

Westsorb *adhesive-coated* machine mounts are solving more than the problem of vibration. Their (exclusive) adhesive coating on both sides prevents looms and all other machinery from "crawling." Eliminates realignment after installation. This minimizes down time—saves money.

Westsorb adhesive-coated felt mountings don't break down under heaviest service impacts. They resist oil, acid, grease, water and age. They are simpler to install than any machine pad. No holes or bolts—no adhesive to apply. Western Felt engineers located throughout the textile areas are anxious to cooperate.

GET THIS DATA

WESTSORB
Vibration-absorbing Machine Mounts

- Quickly installed
- No holes to drill
- No adhesive to apply
- Low "down-time"
- Saves floors
- Less machine repair
- Reduce plant noise
- Thickness for every need
- Engineered for every job

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Chicago 23, Illinois
Branches in all Principal Cities
MANUFACTURERS AND CUTTERS OF WOOL FELTS

Western Felt Works
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Please send 18-page booklet containing data on efficiency tests of Westsorb machine mounts under looms and other equipment.

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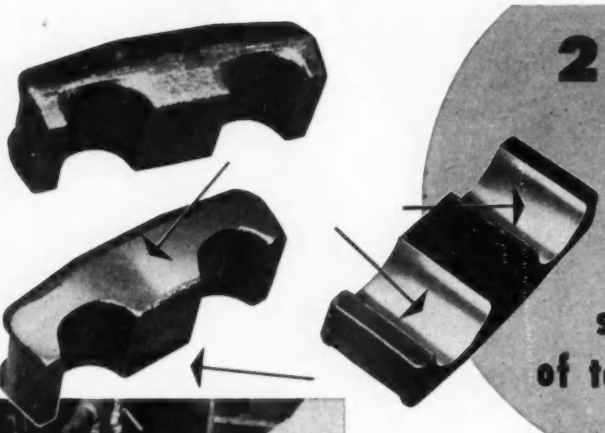
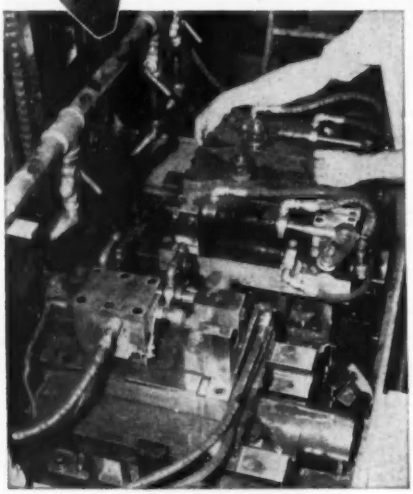


2 separate broaching operations on 1 machine speeds production of tank track parts



the *American* way broached these two sides and these two radii on this tank track part, at the rate of *one part every ten seconds.* The machine used was an American SBD 48-15 Dual Ram Broaching Machine equipped with two American-engineered fixtures, featuring automatic hydraulic clamping, and mounted on two standard receding tables which operate alternately. The left hand table holds two parts for straddle broaching the sides. The right hand table holds two parts for broaching the two radii on each part. A continuous automatic cycle permits the operator to simply load and unload the parts at one fixture while the other fixture broaches.

FULL ROUND BROACHES ADD TO ECONOMY

Full round broaches are used to broach the half rounds. They are simply rotated 180° when dull thus increasing the number of parts produced between resharpenings.

This is a typical example of the complete service you get from American Broach . . . the organization that gives you the extra advantage of experience gained in producing all three . . . broaches, machines and fixtures. For the answer to your problems just send a part-print and hourly requirements. No obligation. Address Dept. I.

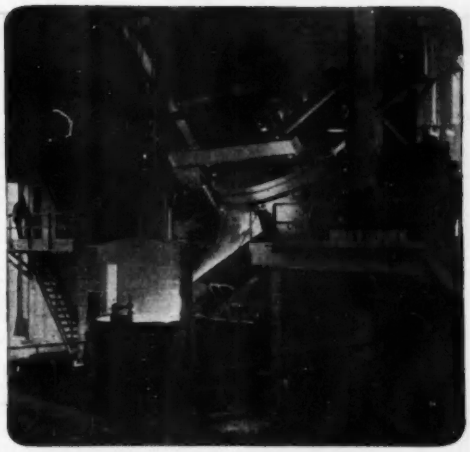
For more information on the American SBD 48-15 write for Circular #300.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Electric Furnace Bearing Steel



Internally Clean... Accurately Rated

Getting rid of non-metallic inclusions is probably the toughest job that confronts any manufacturer of high-grade bearing steels. At Bethlehem we are able to hold inclusions to the minimum by using modern melting methods combined with rigid metallurgical control. And we test every heat at the critical stages of production. As a result of this painstaking care, Bethlehem bearing steels can meet the stringent requirements of the anti-friction bearing industry.

But just as important as our ability to turn out sound steel is our ability to rate or evaluate every heat according to the customers' standards. These standards often vary according to the sizes and bearing components to be manufactured.

Preliminary tests for inclusion ratings are taken by our mill technicians as soon as the billets are rolled. The extent and coverage of this examination is governed by the end use of the finished bearing.

Obviously, any final inspection rating which will be comparative can be realized only where there is a complete understanding between our metallurgists and the customer. Whether you use the 52100 types or low-carbon alloy carburized grades, we will be glad to give you further information on methods of rating, as well as analyses and properties.

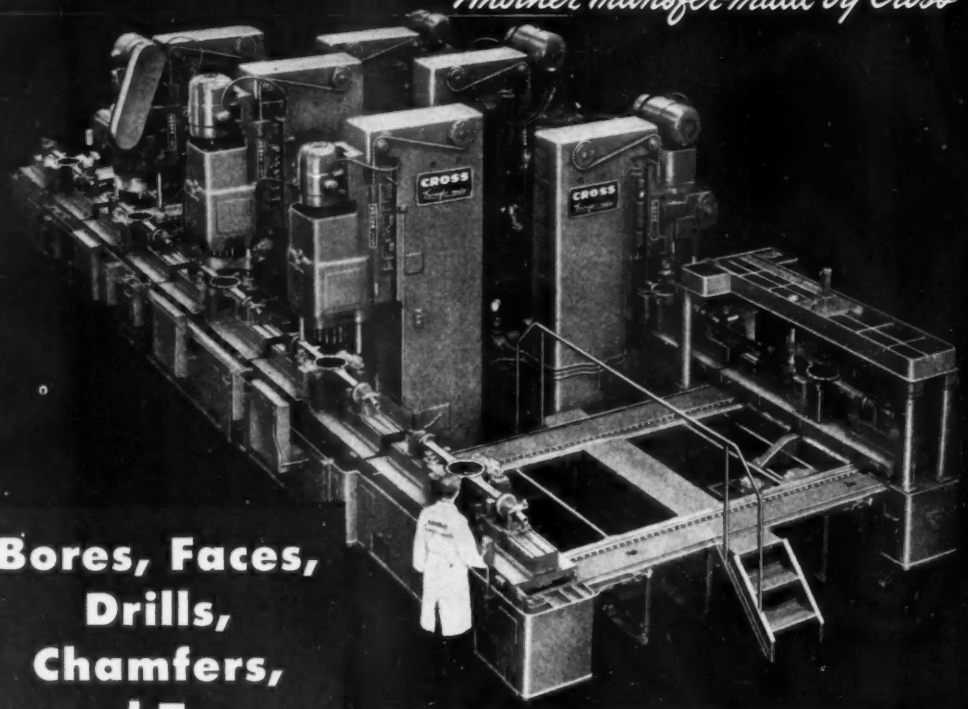
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

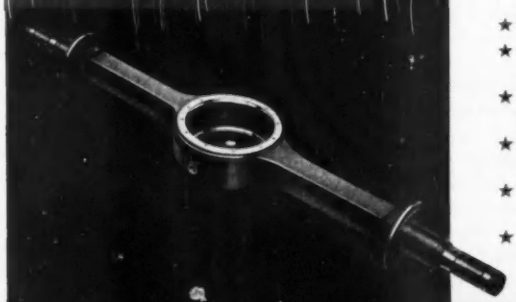
BETHLEHEM *ALLOY* STEELS

BETHLEHEM STEEL

Another Transfer-matic by Cross



Bores, Faces, Drills, Chamfers, and Taps Axle Housings



- ★ Rough and finish bores banjo hole; rough and finish faces banjo face; drills and chamfers holes in banjo face; drills, spotfaces and taps drain hole.
- ★ 35 pieces per hour at 100% efficiency.
- ★ Capacity for housings from two and one-half to five tons.
- ★ Eight stations—one for loading, one for targeting, six for machining.
- ★ Palletized work holding fixtures hold part securely during all operations.
- ★ Phonograph record finish for the banjo face.
- ★ J.I.C. standard electrical and hydraulic construction with stranded wires.

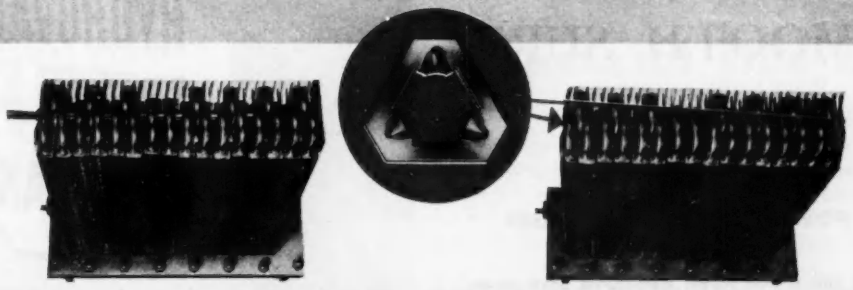
Established 1898

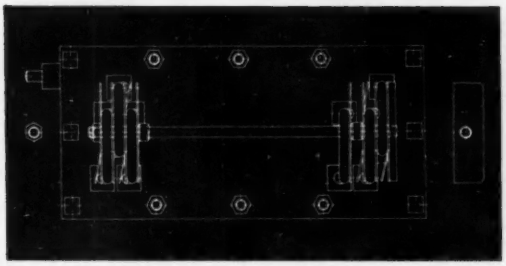
THE CROSS CO.

DETROIT 7, MICHIGAN

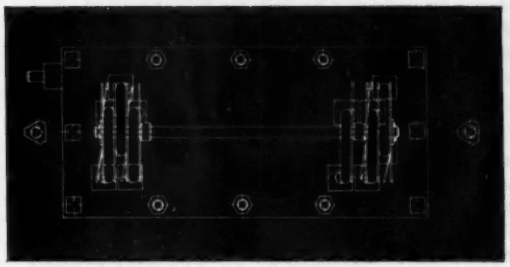
Special MACHINE TOOLS

2 WALDES TRUARC TRIANGULAR RETAINERS REPLACE NUTS... CUT MATERIAL AND ASSEMBLY COSTS 52%





OLD WAY—Tie rod for thermal tubes required threading at both ends, a jam nut at top, a drilled and tapped cast iron tube-rest at bottom. Assembly was slow, costly.



NEW WAY—Truarc Retainers (triangular type) simply push into position at both ends of rod...hold securely without grooves, threads, or nuts. Assembly is inexpensive, speedy!

When the Grinnell Co., Providence, R. I. redesigned their Thermolier Unit Heater to include Waldes Truarc Retaining Rings, they were able to cut down on scarce raw material... eliminate the many machine operations entailed in nut fastening—for a savings of 26½¢ per unit! Truarc Triangular Retainers are self-locking...have unusually high thrust capacity... can be applied at high speed by unskilled labor.

Re-design with precision engineered Truarc Rings and you too will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to hold parts together better, with a never-failing grip. Quick, easy to assemble and disassemble.

Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

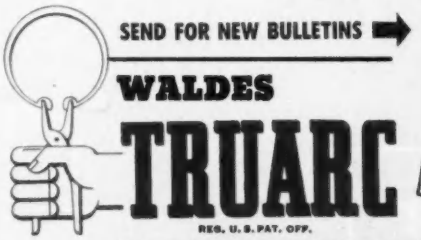
WALDES TRUARC RINGS MADE THESE SAVINGS POSSIBLE...

OLD WAY Parts:	Cost Per Unit	NEW WAY Parts:	Cost Per Unit
tube rest, threaded rod, jam nut	$.306	plain rod, 2 Truarc Rings	$.060
Assembly	.202	Assembly	.183
	$.508		$.243

TOTAL SAVINGS PER UNIT WITH TRUARC RINGS $.265

SEE THE WALDES TRUARC EXHIBIT. IRE SHOW, GRAND CENTRAL PALACE, N.Y.C., MARCH 3 through 6th. Booths 358 & 359•ASTE SHOW, CHICAGO AMPHITHEATRE, MARCH 17 through 21st. Booth 751

For precision internal grooving and undercutting...Waldes Grooving Tool.



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WALDES TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 2,382,947; 2,382,949; 2,416,852; 2,420,021; 2,420,341; 2,420,788; 2,441,846; 2,455,165; 2,483,300; 2,483,383; 2,487,602; 2,487,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING.

Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.
Please send engineering specifications and data on Waldes Truarc Retaining Ring types checked below. AY094

- ☐ Bulletin #5 Self-locking ring types
- ☐ Bulletin #6 Ring types for taking up end-play
- ☐ Bulletin #7 Ring types for radial assembly
- ☐ Bulletin #8 Basic type rings
- ☐ Send me information about the Waldes Grooving Tool.

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More than two and a half million installations have made Hydrovac the undisputed leader in the field of power braking. And now Bendix Products offers Air-Pak, an air-hydraulic unit similar in design and principle to the Hydrovac. Air-Pak changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance.

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Bendix AVIATION CORPORATION

Air-Pak air-hydraulic power brake unit

Hydrovac vacuum-hydraulic power brake unit

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High Spots of This Issue

Close Tolerances a Must in Making Range Finders

Delicate machining problems involved in turning out T-41 range finders at Ternstedt Div. of General Motors Corp. are being solved by the application of automotive techniques. Procedures and equipment used are described. Page 32.

Packard Marine Diesels Feature Aluminum Construction

A series of marine engines being built by Packard for the Navy hold good promise of adaptation to future commercial use with their weight-saving aluminum and interchangeable parts. Other salient features are detailed here. Page 40.

Analyzing Ignition Problems of Piston and Jet Engines

Valuable aids in checking aircraft engine performance, ignition analyzers were studied at a recent conference held by Scintilla Magneto Div. of Bendix Aviation Corp. Several technical papers are included in this report. Page 46.

New Welding Process for Joining Small Aluminum Wires

No complex equipment is needed for this welding method developed by Aluminum Co. of America. Similarly, the process itself is simple and is outlined in this article for possible applications in automobile-aircraft fields. Page 50.

A Fast Accurate Method for Detecting Leaks

The vacuum testing method, a recent development which has stimulated considerable interest, is described in detail here. Equipment and methods used at plants to detect leaks in automotive parts are fully covered. See page 52.

31 New Product Items And Other High Spots, Such As:

How much longer can our freedoms endure adulteration?; Fageol aluminum engine designed for military use; electrospray process saves time and paint; Japanese market opened to new European cars; and coatings protect molybdenum at high temperatures.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

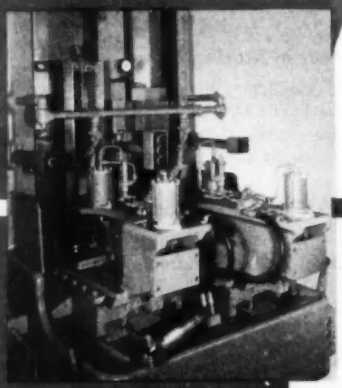
AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

DEFENSE APPLICATIONS

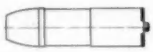
For Cincinnati Vertical Hydro-Broach Machines

broaching gives you quick action in boosting production and lowering costs. This efficient method of machining should be employed wherever possible in the production of defense equipment items. Of course, a lot depends upon tooling, so if you need ideas write for our folder "How to Step Up Production with Cincinnati Hydro-Broach Machines," No. M-1599. And when you decide upon broaching, Cincinnati is your best choice. Our broaching specialists will be glad to help you with the application.

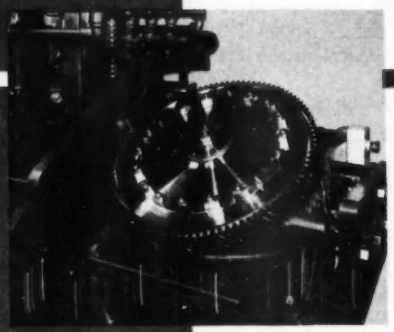
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



AUTOMATIC FIXTURES REDUCE EFFORT IN BROACHING KEY ON MORTAR SHELLS

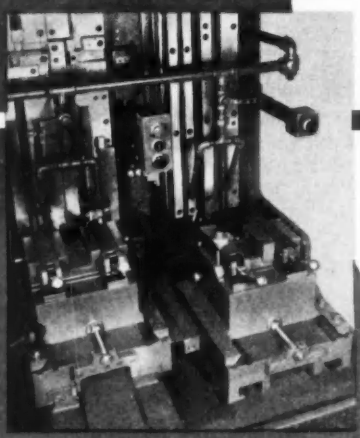


Part name ..... Chemical mortar shell
Material ..... Steel
Operation ..... Broach key on base
Stock removal ..... 1/16"
Production ..... 345 per hour
Machine ..... CINCINNATI No. 5-42 Duplex Vertical Hydro-Broach



BROACHING TURBINE BLADE SLOTS IN ROTORS

Part name ..... Rotor
Material ..... Heat-resistant alloy steel
Operation ..... Broach turbine blade slots
Stock removal ..... From solid
Production ..... Depends upon several variables. For the above material . . . on 66" stroke machine, 2 cuts, 1.38 minutes per slot; on 90" stroke machine, 1 cut, .9 minutes per slot
Machine ..... CINCINNATI Single Ram Vertical Hydro-Broach



ENTIRE PROFILE OF DETENT BROACHED IN FOUR PROGRESSIVE OPERATIONS

Part name ..... Detent
Material ..... Steel forging
Operation ..... Broach profile complete
Stock removal ... 3/32" average
Production ..... 98 per hour, completely broached
Machine ..... CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • PLASTIC HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 5 September 1, 1952

Chrysler Develops Air Conditioning for Cars

Chrysler Corporation is the second of the Big Three to announce it has developed an air-conditioning system for automobiles. While its announcement did not say specifically when the unit would be offered, it is understood that it probably will appear on the Chrysler line for 1953 as optional equipment. The unit was developed as part of a program dating back to 1939.

Specific details about location of the Chrysler compressor unit were not given, but the company says that it is different from previous air-conditioning units in that it draws at least part of the air supply from outside the car. This slightly pressurizes the interior, preventing seepage of hot air from the outside into the body. Capacity of the unit is considerably greater than that of window-type air conditioners used in homes, but power requirements from the car's engine are said to be only minor. The cold dehumidified air is forced into the car through a grille located on the shelf behind the rear seat. Screened fresh air intakes are mounted on both sides of the body and blend into the body lines. The unit currently is under test by Chrysler Engineering Div. which developed the unit in cooperation with the Air-Temp Div.

Lincoln-Mercury Moves To New Assembly Plant

Lincoln-Mercury Div. is moving its automobile assembly operations from the old Lincoln plant in Detroit to the new assembly plant at Wayne, Mich. Transfer of machinery, equipment, and partially fabricated assemblies will be completed with no loss of production by about mid-October, at a cost of more than $1 million.

Body-in-white units already are coming off the line at the new plant and shipped back to Detroit to enable the plant there to continue operations while the move is being completed.

A part of the main manufacturing building at Wayne has been set aside for production of jet aircraft engines for the Navy. At press time the company had made no announcement of ultimate disposal plans for the old Detroit plant.

ARMY'S NEW MULE

This one will go straight up. The H-25 evacuation, assault, and transport helicopter is in production at Piasecki Helicopter Corp. A new version of the Navy HUP, the "Mule" can carry six men, or three litters and a medical man, plus a crew of two. It is powered with a 550 hp Continental Motors Corp. engine.

Buick Reports Black Losing Favor

Although still chosen by the greatest number of buyers, black cars are losing their popularity, at least among Buick buyers, according to the sales department. Black cars were specified by only 9.2 per cent of Buick buyers through July of this year, a drop of 4.1 per cent from a year ago.

Federal Truck to Merge With Fawick Airflex

Federal Motor Truck Co. will merge with Fawick Airflex Co., Inc. of Cleveland, if stockholders of both companies approve. The new company would be called Federal-Fawick Corp., and would be composed of a Fawick Airflex operating division and a Federal operating division. Fawick was founded in 1938 and manufactures heavy duty clutches and brakes, and similar equipment for industrial uses.

The merger would provide Federal with much greater diversification of products, and Fawick would gain increased manufacturing facilities which it now needs. Headquarters of the new corporation would be in Cleveland.

News of the AUTOMOTIVE

Brazilian Plant Announced by Willys-Overland

Plans for the establishment of a Willys-Overland Motors, Inc., assembly plant at Sao Paulo, Brazil, for the production of Jeeps, station wagons, trucks and Aero Willys passenger cars were announced recently.

The plant, already under construction, will be owned by "Willys-Overland do Brasil," a company organized by Willys-Overland Export Corp. and prominent Brazilians long engaged in distribution of Willys products in that country. Vehicle assembly operations are expected to provide immediate employment for hundreds of Brazilians, it was stated. Additional employment may be expected as facilities are developed for the manufacture in Brazil of component parts for the Willys vehicle line.

Stewart-Warner Acquires British Subsidiary

Stewart-Warner Corp. has purchased substantial stock interest in Uni-Gun Lubricating Equipment, Ltd., of London, England, a company which presently manufactures products similar to Stewart-Warner's Alemite lubrication equipment line.

Along with its stock interest Stewart-Warner will have operating control of the British concern, and will make available all Alemite designs and developments.

Temco Will Build McDonnell Demon

Temco Aircraft Corp., Dallas, Tex., announced it has signed a licensing agreement with McDonnell Aircraft Corp. and has been awarded a prime contract by the Navy to produce an undisclosed number of McDonnell F3H Demon jet fighters.

The dollar value of the contract was not given, but it was disclosed that Temco will build the swept-wing fighter at its Dallas plant.

Steel Firms to Stock Ore by Rail Shipment

Steel companies are preparing to use rail transport to build up stocks of iron ore for next winter to compensate for loss of such stock-piling during the steel strike. United States Steel Corp. already has received the first shipment of a scheduled two million ton stockpile to be moved to its plants by rail. The cost of shipping ore by rail is about $1.50 per ton higher than by the usual lake carrier-rail route.

Stock Group Asks K-F To Drop Car Building

The Kaiser-Frazer Corp. stockholders protective committee has become vocal following the company's 6-month report showing a loss of over $8.5 million on automotive operations, which was reduced to $6 million by a profit of more than $2.5 million from defense work. The committee stated that the loss amounts to $269 per car, in contrast with promises made at the last annual meeting of a profit this year.

The group threatens to force replacement of the present management and a change in the company's policies, including getting out of the automobile business, unless the directors take such steps voluntarily. The committee charged that shareholders' original $56 million investment in the company has shrunk to slightly more than $4 million, and that losses over the last 4 years have reduced book value to less than $1 a share.

Dow to Spend $600,000 On Magnesium Foundry

Dow Chemical Co. is planning to expand its magnesium foundry at Bay City, Mich., at a cost of $600,000. DPA has granted a certificate of necessity.

ITALO-AMERICAN SPORTS CAR

An American chassis and stock car engine are combined with an Italian body in this new closed sports car. B. S. Cunningham Co., builds the frame of welded tubing, and mounts a Chrysler V-8 engine which is said to be standard except for a four-carburetor manifold. Other components are built up from reworked Ford and Chrysler parts. The body is supplied by Vignale of Turin, Italy. Technical specifications were not available at press time, though price was announced as $9,000. The car is now being delivered.

AND AVIATION INDUSTRIES

Production Recovery Is Very Rapid

Starting this month, automobile and truck production will be back approximately to pre-strike levels of 125,000 units per week. Recovery from the 55-day steel strike was much more rapid than had been expected although there were still shortages in certain types of steel and probably will continue to be for many weeks.

There seems to be considerable disagreement about the number of cars and trucks that have been, or will be, lost as a result of the strike but it probably is somewhere between 400,000 and 500,000. At any rate, it is highly unlikely that industry this year will be able to turn out more than 4.1 million passenger cars and something more than 1 million trucks, including military vehicles.

Want Higher Quota

Automotive industry representatives have taken sharp issue with NPA over the amount of steel being set aside for military programs, contending that it is much higher than defense industry can use and unnecessarily limits civilian production. Industry also is not happy when NPA's decision to limit production to the originally planned 1.05 million units during the last quarter, even though materials were granted for only 80 per cent of that number. Despite inventories having been largely depleted during the strike, manufacturers believe the situation has been improved enough to increase production, through NPA's permission for them to purchase conversion steel in amounts up to 40 per cent of their allotment without having it charged to their CMP steel quota.

Controls May Fall

Looking to next year, it appears that, barring a major upset in the defense program, materials will be available in ample enough supply to remove controls by the end of the first quarter. This would mean the automobile industry could proceed on an all-out basis and from all indications the limit on production would be sales rather than materials. Even with the long steel strike and the curtailed vehicle production that resulted from it, sales of new cars have not picked up too much and a real competitive battle is shaping up for next year.

Car and truck prices appear to be headed upward. Not only is steel higher in price but component parts manufacturers also now are petitioning for full cost increase allowances and are likely to get them under the current OPS policy. In addition, labor costs under cost of living contracts again took a jump on September 1. It is likely that higher costs will be absorbed on most 1952 models, but higher price tags will come on the 1953 offerings.

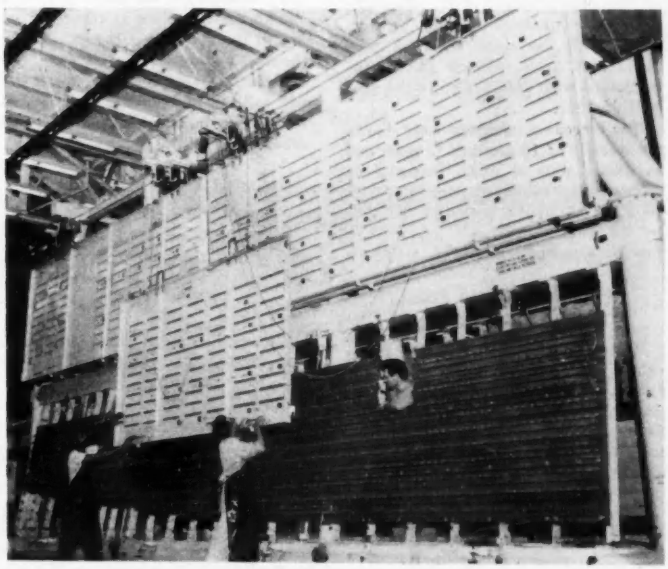
Car Output Rate Set at 5 Million

Automobile production next year should start at an annual rate of five million passenger cars, according to NPA. First quarter production allowances probably will be set at one and one quarter million cars.

Army Delays Approval of New T-41 Tank

Although the Army Field Forces have not yet accepted the T-41 tank being produced by Cadillac, the vehicles would be put into service in case of an emergency and would be highly acceptable. The Ordnance Corps has accepted the tanks and the field forces are holding up only to achieve the utmost perfection in the gun fire mechanism.

Actually, there is no great fault in the gun firing device, but since there is no pressing need for the tanks at the moment, the field forces are aiming at improving the mechanism to achieve an even higher state of perfection. For its part, Cadillac has met all specifications and the particular mechanism involved is supplied by another manufacturer for installation by Cadillac. Engineers at the Cleveland tank plant are working on a new design for the mechanism.



TWO-STORY DRILL JIG

This tool, 35 ft long and 17 ft high, holds a bank of magnesium floor planks while drilling holes for assembly and for tie-down fittings. Drill plates, five on each side, are raised and lowered electrically. Fifteen men can work on each side. Lockheed Aircraft Corp. designed the jig to speed assembly of Navy Super Constellations.

News of the AUTOMOTIVE

Sales Up, Profits Down

Net income reports for the first half of 1952 throughout various industries show both a rise and a decline compared to 1951. Thirteen car and truck makers averaged a four per cent decline in income, although their second quarter income was reported up seven per cent. Twenty-two automobile parts manufacturers averaged a 15 per cent decline, while forty-one machinery builders reported an average of a five per cent increase in income in the first half.

This compares with an average 13 per cent drop in income for 460 leading manufacturers in all fields, although sales for the same group rose 5 per cent over last year.

Chrysler Profit Up Despite Sales Drop

Latest financial report of Chrysler Corp. shows an increase of 22 per cent in net earnings for the first half of this year despite heavier taxes and a 10 per cent drop in sales, as compared with the same period a year ago. Net profit totaled $43,689,486 compared with $35,764,210 in the first half of 1951.

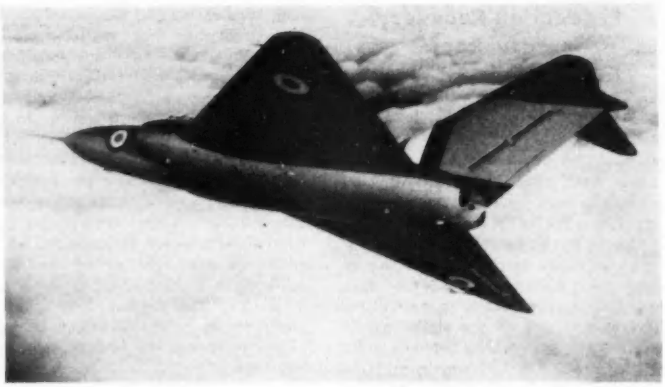
The increased earnings were due to a reduction of 16 per cent in costs and expenses, plus a price increase on automotive vehicles permitted by OPS. Federal taxes during the 1952 period were three times larger than for the same period a year ago.

Willys 9 Months Sales Reach All-time High

Willys-Overland Motors, Inc., produced a sales record this year that is far ahead of anything in its history. Sales for the first nine months of its fiscal year ended June 30 totaled more than $234.4 million, or more than for any prior full year. Net profit after taxes totaled more than $5.1 million, 53 per cent more than for the corresponding period a year ago.

Fruehauf Earnings Dip Despite Sales Gain

Although sales increased nearly $10 million in the first half of this year compared with the corresponding period a year ago, earnings of Fruehauf Trailer Co. declined about $415,000. Reason for the lower profit was the higher tax rates in effect, according to the company's report. During the first six months of this year, sales of defense material totaled more than $30 million and at the end of June orders for military type trailers exceeded $90 million.



DELTA WING IN PRODUCTION

The Gloster GA5 multi-purpose fighter is said to be the first delta wing aircraft to be put into production. Twin Armstrong Siddeley Sapphire jet engines, at 8300 lb thrust each, give an undisclosed top speed at about that of sound at high altitudes.

GM Sales Financing Settled by Decree

After 13 years of litigation, General Motors Corp. has accepted a consent decree involving both the corporation and its subsidiary, General Motors Acceptance Corp. The court order requires equal opportunities for other finance companies to participate in sales of GM cars.

General Motors, unlike Chrysler and Ford, which a year earlier had bowed to consent decrees and had severed their connection with subsidiary finance companies, continued the legal battle until late in July of this year. The consent decree provides that any services supplied to GMAC by General Motors must be given to other firms participating in GM time sales, and prohibits the corporation from cancelling franchises of dealers who do not use GMAC financing.

Hupp Corp. Pays First Dividend in 22 Years

Hupp Corp. late in July paid its first dividend in 22 years. The 10 cent dividend is the first since 1930. For the first half of this year earnings showed an increase to $410,524 from $240,076 in the same period a year ago.

June Automotive Credit Showed Large Increase

A large increase in automotive installment credit during June helped push outstanding credit at the end of that month to the second highest level on record—more than $20.2 billion. Direct credit by automobile dealers increased $262 million during the month and installment credit loans by banks and other finance agencies, much of it used to finance car purchases, rose $291 million.

Tungsten, Molybdenum Supply Improving

The world supply of tungsten and molybdenum apparently is showing considerable improvement. Third quarter allocations of tungsten to American industry are up 30 per cent and molybdenum has been increased 15 per cent.

AND AVIATION INDUSTRIES

New Michigan Plant To Make Pig Iron

Michigan is to have a new producer of pig iron to provide a near-at-hand source of raw material for automotive and other foundries. A new company, Michigan Iron and Coke Co., has been founded and will erect a multi-million dollar blast furnace and coke oven plant near St. Clair, Mich., about 60 miles northeast of Detroit on the St. Clair River.

The plant will have an annual capacity of about 300,000 tons of merchant pig iron and 350,000 tons of coke. Raw materials will be delivered to the plant by water primarily, making for a lower cost operation. Estimated cost of the plant is about $20 million.

Foreign Car Sales Increase in U.S.

Imports of foreign cars into the United States so far this year are considerably ahead of the same period a year ago. According to R. L. Polk & Co., registrations of foreign cars through June total 13,041 compared with 9459 for the same period a year ago. At the same time, U. S. vehicle exports dropped numerically to 200,445 units compared with 265,248 in the first six months of 1951.

Related to total production, however, percentage is up slightly, showing 7 per cent of factory sales going to the export market compared with 6.8 per cent during the first half of last year. Breakdown of exports includes 105,898 cars, 94,068 trucks and 479 buses. Sales to foreign markets in June dipped to 30,895, the lowest monthly level this year.

GM-Holden Largest Australian Earner

General Motors-Holden, Ltd., like its parent organization in the United States, is the largest profit maker in its own country. The GM subsidiary had a net profit last year of $7.5 million after provision of $9.27 million for taxes, the largest yearly earnings ever made by an Australian company. Last year the company sold 21,225 Holden passenger cars, the largest seller on the Australian market.

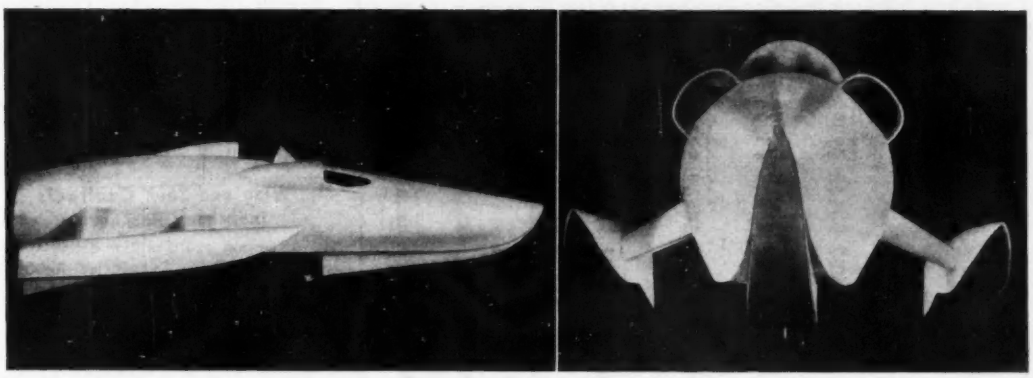
Fiat Will Make Parts for Allison Engines

The Fiat Co., Modena, Italy has been licensed to manufacture spare engine parts for Allison J35-A-29 engines in Republic F-84G Thunderjets sold to USAFE and NATO countries, it was announced recently. The license agreement was negotiated by representatives of the U. S. Air Force, Fiat and Allison Div. of General Motors Corp.

French Hotchkiss Plant Suspends Production

Hotchkiss Automobile Co. of Paris, France, has ceased production but has kept commercial and drawing office staffs intact for a resumption which, it is claimed, will take place at an unknown date. Apparently this resumption is dependent on obtaining military orders. Although the company showed a profit last year, all this was used to partially pay off the losses incurred during the three previous years.

In addition to producing two six-cylinder models and the Gregoire-Hotchkiss flat-four light alloy passenger car, as well as some light trucks, Hotchkiss has a military vehicle department which is said to be without orders. An effort is being made to get army contracts or an order for building the Ferguson tractor.



JET WILL TRY FOR RECORD

A jet-engine powered hydroplane, of which this is a model, is being built for John Cobb, British holder of the world land speed record. A De Havilland Ghost jet engine will be used in an attempt to break the 178.4 mph record set by Stanley Sayres. The hull and sponsons are of birch plywood reinforced with aluminum. Outrigger beams and the planing surfaces are of aluminum. Overall length of the boat is 31 ft and span over the sponsons is 13 ft. Weight is expected to be about three tons. The design was checked with rocket powered models, including a large model of one-sixth scale that was timed at 97 mph. Four firms are collaborating.

News of the AUTOMOTIVE

Army Vehicle Modifications May Save $32 Million

Modifications adopted for Army tactical vehicles will save an estimated $32 million on vehicles to be procured under present contracts, the Dept. of the Army said recently.

Savings are said to be the result of more than a year of intensive study and service testing of automotive equipment to determine where economies could be made without impairing operational effectiveness. The panel was composed of representatives from the Dept. of the Army, the Chief of Ordnance, and experts from the automobile industry.

The project involved what the Army calls its "primary wheeled vehicles," trucks of the one-quarter, three-quarter, two and one-half, and five-ton types. Specially built models of these vehicles were constructed under relaxed specifications for purposes of the tests.

One of the principal modifications is said to provide shallow fording capabilities (30 in.) in place of the former deep-water fording feature on tactical vehicles. By elimination of certain water-proofing it has become possible to substitute an open-type generator which is less costly and more efficient than the sealed type. One generator will now fit all trucks from one-fourth ton to 10-ton size. As a result, nine generator assemblies and several hundred spare parts can be eliminated.

Another feature of the new program is the provision of "kits" to accomplish certain modifications in the field which will enable vehicles to operate under specific terrain or climate conditions.

Nash Head Predicts Atomic-Powered Car

For the first time a responsible automobile industry official has predicted a possibility of atomic power for automobiles. George W. Mason, president of Nash-Kelvinator Corp., wrote last month that within the next twenty to thirty years some kind of atomic-powered vehicle will be developed. He points out that already extensive work is being done on atomic powered submarines, aircraft engines, and battleships.

Renault Rear-Engine Car to be Assembled in Japan

The nationalized Renault Co. of France has signed an agreement for the assembly of its rear-engine four-passenger automobile at Tokyo, Japan, by the Hino Diesel Co. The car will be shipped to Japan knocked down, to be assembled, upholstered and painted and sold throughout Japan by distributors. Renault states that they are not financing the Japanese company.

The rear-engine car is Renault's biggest production line, output last year being 99, 886 cars and light vans.

M.S. in Metallurgy Is Offered by NYU

New York University will offer the degree of Master of Science in Metallurgy for the first time with the opening of the regular academic year.

The curriculum, which will stress metals technology and physical metallurgy, includes courses in X-ray metallography, electron theory of metals, metallurgical laboratory techniques, and alloys for special temperature conditions.

Gar Wood Adds United Stove

Gar Wood Industries, Inc., reported recently the acquisition of United Stove Co., Ypsilanti, Mich., in an exchange of stock. The subsidiary will continue to manufacture stoves, burners and automotive parts, and in addition will be used for various operations now conducted by Gar Wood divisions or by subcontractors.

Wing and Shell Contracts Increased For Servel

A second multi-million-dollar contract for F-84 Thunderjet fighter-bomber wings has been awarded Servel, Inc. by Republic Aviation Corp., according to a recent announcement. At the same time the Air Force announced that Servel is now the largest producer of military airplane wings in the world.

An additional contract for 105-mm howitzer cartridge cases brought to approximately $10 million contracts obtained from the Ordnance Dept.

1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Six Months' Totals

MAKE	June 1952	May 1952	June 1951	SIX MONTHS Units 1952	SIX MONTHS Units 1951	SIX MONTHS Per Cent of Total 1952	SIX MONTHS Per Cent of Total 1951
Chevrolet	25,452	24,842	32,621	134,206	181,931	33.65	35.26
Ford	15,862	16,606	22,161	91,569	129,065	22.95	24.82
Dodge	8,620	7,979	9,347	47,348	55,209	11.87	10.70
International	7,585	8,113	6,643	44,905	46,363	11.26	8.99
G. M. C.	6,808	6,956	8,691	38,953	51,724	9.76	10.02
Studebaker	2,584	2,615	2,574	14,230	15,540	3.57	3.01
White	958	936	1,071	5,561	6,765	1.39	1.31
Willys Truck	977	881	1,130	5,300	8,102	1.33	1.57
Willys Jeep	696	683	777	3,886	4,459	.98	.86
Mack	606	697	745	3,584	5,796	.90	1.12
Diamond T	224	314	384	1,812	2,529	.45	.49
Reo	268	247	308	1,527	2,002	.38	.29
Divco	216	256	304	1,524	2,107	.38	.41
Brockway	101	150	136	802	1,326	.20	.26
Autocar	128	115	165	799	1,161	.20	.23
Federal	57	50	83	392	624	.10	.12
Kenworth	42	59	55	351	367	.09	.07
Pontiac	41	31	82	286	387	.07	.08
F. W. D.	29	39	31	262	253	.07	.05
Sterling	16	16	27	129	188	.03	.04
Peterbilt	20	20	9	116	164	.03	.03
Misc. Domestic	181	150	103	1,205	792	.30	.15
Misc. Foreign	10	34	14	171	121	.04	.02
Total—All Makes	71,471	71,690	87,461	399,932	515,975	100.00	100.00

* Based on data from R. L. Polk & Co.

AND AVIATION INDUSTRIES

DPA Eases Freeze on Machine Tools

Good news for machine tool builders and the automotive industry came from DPA at the end of July. The agency has revoked its freeze on manufacture of machine tools for civilian industry, in effect since last November, which prohibited delivery of unrated or civilian machine tools. Henceforth, machine tool builders may deliver orders without defense priority rating so long as they do not conflict with production of equipment needed for defense work.

The machine tool industry has reported that a large number of companies, most of them small, could not operate at full production because of too few military orders and a ban on civilian business.

Willys Gets Second Landing Gear Order

Willys-Overland Motors, Inc., has received a $3 million order for landing gears from Beech Aircraft Corp., to equip T-36 training planes. The new order from Beech brings Willys' landing gear backlog to about $6 million.

NPA Handling Government Tool Leasing Program

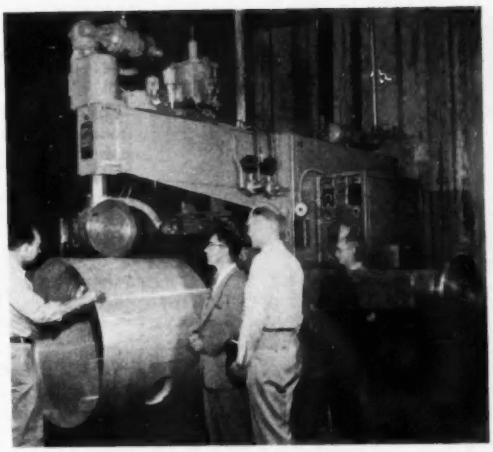
Some 30,000 machine tools and others pieces of metal-working equipment will be made available on a lease basis to companies having defense contracts and defense supporting programs. They will be leased for up to three years at a fee of one per cent of the original cost per month.

Central inventory branch of NPA, since it took over the Government's tool disposal program from the military services about three months ago, has turned up and cataloged this idle equipment. Tools available do not include many critically short items, such as vertical turret lathes, boring mills, grinders, milling machines and drill presses, although a few of these have turned up.

Survey teams will continue their search of Government installations to discover more such equipment.

GIANT WELDER

This Sciaky welder at Northrop Aircraft, Inc., has two interchangeable arms, and will weld a 60-in. seam or a five-ft cylinder. Maximum pressure is 10,000 psi, and the welder will handle either Alclad or steel at 24 in. per min, it is said.



Six Months' Retail Car Sales Valued at $4,457,000,000*

Price Group	June 1952 Sales Units†	June 1952 Sales % of Total	June 1952 Dollar Volume Dollars	June 1952 Dollar Volume % of Total	Six Months 1952 Sales Units†	Six Months 1952 Sales % of Total	Six Months 1952 Dollar Volume Dollars	Six Months 1952 Dollar Volume % of Total
Under $2,000	216,497	51.45	$382,206,793	43.01	1,127,494	53.03	$1,989,302,743	44.62
$2,001 to $2,500	124,418	29.56	275,012,202	30.94	649,562	30.55	1,440,214,997	32.31
$2,501 to $3,500	61,860	14.70	165,623,931	18.63	263,608	12.40	714,394,436	16.03
Over $3,500	18,074	4.29	65,990,146	7.42	85,502	4.02	313,602,737	7.04
Total	420,849	100.00	$888,833,072	100.00	2,126,096	100.00	$4,457,514,913	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	June 1952	May 1952	June 1951	Six Months 1952	Six Months 1951	Per Cent Change: June over May	June over June 1951	Six Months 1952 over 1951
1	New England	25,336	26,211	25,200	126,151	162,633	− 3.44	+ .54	−22.43
2	Middle Atlantic	80,778	82,862	93,305	403,536	535,561	− 2.54	−13.43	−24.65
3	South Atlantic	50,884	48,986	54,992	256,363	332,463	+ 8.30	− 7.46	−22.88
4	East North Central	107,759	105,484	112,223	551,388	730,644	+ 2.17	− 3.97	−24.53
5	East South Central	19,639	19,044	20,706	99,962	129,334	+ 3.12	− 5.15	−22.69
6	West North Central	42,547	40,254	48,049	212,258	291,850	+ 5.70	−11.48	−27.27
7	West South Central	36,519	36,431	38,279	190,110	244,249	+ .24	− 4.60	−22.17
8	Mountain	15,393	13,348	14,822	72,046	93,249	+15.32	+ 5.27	−22.74
9	Pacific	44,790	51,577	47,290	227,939	288,603	−13.16	− 5.29	−21.02
	Total—United States	423,655	422,217	454,865	2,139,875	2,809,586	+ .34	− 6.82	−23.81

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wis.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

BLACK & DECKER EXPANDS

Final assembly of large tools produced by Black & Decker Mfg. Co. starts here in its new Hempstead, Md., plant. Designed for expansion to 1 million sq ft, the present building has a 40-ft basement service area paralleling the facade shown, which will be extended through the expansion.

U. S. Rubber, CIO Sign Agreement

United States Rubber Co. announced recently that it has signed a new wage agreement with the United Rubber, Cork, Linoleum and Plastics Workers of America, CIO, calling for a 10 cents per hour wage increase effective August 11.

The new contract, subject to approval by the W.S.B. and union locals, covers 35,000 U. S. Rubber employes in 19 plants throughout the nation.

Warner Brakes in Britain

The Warner Electric Brake & Clutch Co. recently named Westool, Ltd., Durham, England, as its sole licensed agent to manufacture the Warner line of industrial electric brakes and clutches in the British Isles. In addition to its manufacturing activities, the company will also provide sales and service facilities.

McCulloch Motors Adds Stamping Concern

Exacto Manufacturing Co. of Inglewood, Calif., has been purchased by McCulloch Motors Corp. The Exacto Company, which produces metal stampings, is the fourth acquisition in the past 18 months by McCulloch and is another step in a large expansion program begun early in 1951. Previously acquired companies included Pacific Optical Corp. and Rhodes-Lewis Co. Since the beginning of the expansion program an aircraft division began helicopter manufacturing operations.

Ford Continues Hunt For Michigan Ore

Ford is continuing its search for new mineral formations in its northern Michigan holdings in an effort to discover possible future supplies of iron ore. There are several ore deposits on Ford property, but much of it is low grade and not economical for development under present conditions.

The company is continuing, however, to develop processes for recovering the low grade ores. In 1949 it set up a company in cooperation with M. A. Hanna Co. to build a pilot ore concentrating plant in northern Michigan to develop techniques for the beneficiation and concentration of the type of ore found on Ford property.

Exploration for uranium-bearing metals also has been carried on, but with negative results to date.

Westinghouse to Construct Philadelphia Laboratory

Ground was broken recently for a $6 million steam and gas turbine development laboratory at the South Philadelphia Works of the Westinghouse Electric Corp.

Actual construction of the four-story, brick and structural steel building will begin late this summer and will take about a year to complete. It will employ a staff of nearly 100 engineers and technicians and, initially, will do research for the Air Force.

(*Turn to page* 114, *please*)

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Six Months' Totals

MAKE	June 1952	May 1952	June 1951	SIX MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	85,052	87,033	94,921	446,136	605,602	29.65	21.57
Ford	68,012	70,670	79,557	354,847	487,186	16.58	17.35
Plymouth	46,988	45,237	57,198	235,355	303,397	11.00	10.80
Buick	30,474	31,040	33,015	161,409	221,061	7.55	7.87
Pontiac	27,642	26,236	27,762	134,817	184,800	6.30	6.58
Dodge	31,344	27,662	27,589	131,016	157,978	6.12	5.62
Oldsmobile	21,650	22,062	23,439	113,770	153,013	5.32	5.45
Studebaker	15,627	16,333	16,263	89,758	105,626	4.19	3.76
Mercury	16,686	18,240	21,175	89,663	128,374	4.19	4.57
Nash	16,769	15,478	11,708	72,256	67,061	3.38	2.39
Chrysler	11,902	11,434	14,958	61,518	87,079	2.87	3.10
De Soto	8,972	9,150	10,506	47,668	58,778	2.22	2.09
Cadillac	8,301	8,302	7,892	42,017	51,356	1.96	1.83
Hudson	8,300	8,270	7,940	40,388	57,612	1.88	2.05
Packard	7,553	6,890	5,150	35,309	36,597	1.65	1.30
Kaiser	3,951	3,868	4,141	19,797	30,948	.93	1.10
Willys	4,414	3,676	2,503	17,724	14,019	.83	.50
Henry J	4,035	4,435	4,612	17,486	30,818	.82	1.10
Lincoln	2,807	2,808	1,986	12,476	13,710	.58	.49
MG (British)	831	868	.....	3,232	.....	.15	.....
Austin (British)	413	540	239	2,523	1,755	.12	.06
Hillman (British)	426	404	.....	2,096	.....	.10	.....
Crosley	323	374	476	1,875	3,076	.09	.11
Ford (British)	332	327	267	1,605	1,473	.08	.05
Jaguar (British)	288	245	.....	1,337	.....	.06	.....
All State	171	176	.....	738	.....	.03	.....
Misc. Domestic	24	50	288	830	1,036	.04	.04
Misc. Foreign	388	378	1,097	2,048	6,231	.10	.22
Total—All Makes	423,655	422,217	454,665	2,139,875	2,806,596	100.00	100.00

*Based on data from R. L. Polk & Co.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Campbell, Wyant and Cannon Foundry Co.—Horace A. Deane has been elected a vice president.

Ford Motor Co., Ford Div.—New assistant general manufacturing managers are **James O. Wright**, planning and quality control; and **W. D. Singleton**, operation of assembly plants.

Chrysler Corp.—**Richard S. Shannon** was appointed assistant to the vice president in charge of sales recently.

Westinghouse Electric Corp., Air-Arm Div.—**Rear Adm. Martin P. Hottel**, USN (Ret.), has been named division manager.

Chrysler Corp., Tank Plant (Detroit)—**Martin Bizjack** was named superintendent of machining recently.

Ford Motor Co., Ford Div.—Franklin A. Vickers was named assistant manager of car sales.

Continental Screw Co. — Recently announced are the following changes in the technical staff: **Harvey F. Phipard, Jr.**, is appointed to the position of director of research and engineering; **Edward J. Locke, Jr.**, is appointed to the position of chief engineer; **George E. Jenney, Jr.**, is appointed to the position of master mechanic.

Temco Aircraft Corp. — **Floyd R. Ridgeley** has been promoted to superintendent.

Dow Chemical Co.—**Hubert Fruehauf** has been named manufacturing manager for the magnesium department. **A. T. Peters** has been promoted to assistant manager of the Bay City division and **C. D. Tucker** has been advanced to foundry superintendent.

Firestone Tire & Rubber Co.—C. J. McCrory became manager of truck tire sales recently.

Packard Motor Car Co. — **Leroy Spencer** has resigned as executive vice president to become West Coast manager. **Eugene C. Hoelzle** has retired as vice president, comptroller and secretary and is succeeded as comptroller by **Wilmer B. Hoge.** Three recently elected vice presidents are **Fred J. Walters**, in charge of marketing; **Albert H. Behnke**, and **C. Wayne Brownell.**

General Motors Corp., United Motors Service Div.—**W. A. Hagen** has become general sales manager.

Houdaille-Hershey Corp.—**Charles B. Eisenhauer** was recently made manager of manufacturing.

Gould-National Batteries, Inc.—**Frederick W. Roth** was elected vice president in charge of the industrial division recently.

General Motors Corp., Buick Div.—**John F. Kennedy** has been promoted to assistant general superintendent on the J-65 Sapphire jet engine project, while **Justus I. Taber** has been named superintendent of the transmission plant.

Cutler-Hammer, Inc.—**F. C. McNicol** was appointed manager of industrial control sales recently.

General Motors Corp., Hyatt Bearings Div.—**John R. Gilmartin** is now general sales manager.

R. M. Hollingshead Corp.—**Otto J. Blank** has been appointed vice president in charge of production.

Norton Co.—**Roger Magoun** became the company's economist recently. **David Reid** was named superintendent of grain and bond plants.

General Motors Corp., Chevrolet Div.—**John F. Smith** has been named plant manager of the Saginaw, Mich., gray iron foundry.

Chrysler Corp., Dodge Div.—William S. Woolsey was appointed director of truck sales recently.

B. F. Goodrich Co.—**Elmer A. Stevens** was promoted to treasurer recently.

General Motors Corp.—**Elmer Bailey** was recently made service section director of the technical center.

(*Turn to page* 106, *please*)

Necrology

Stanwood W. Sparrow, 64, vice president in charge of engineering for Studebaker Corp., and a past president of the SAE, was killed in an automobile accident Aug. 14, near Southbridge, Mass.

Marshall E. Beaman, 43, assistant general industrial relations manager for the Ford Motor Co., died in Detroit, Aug. 7.

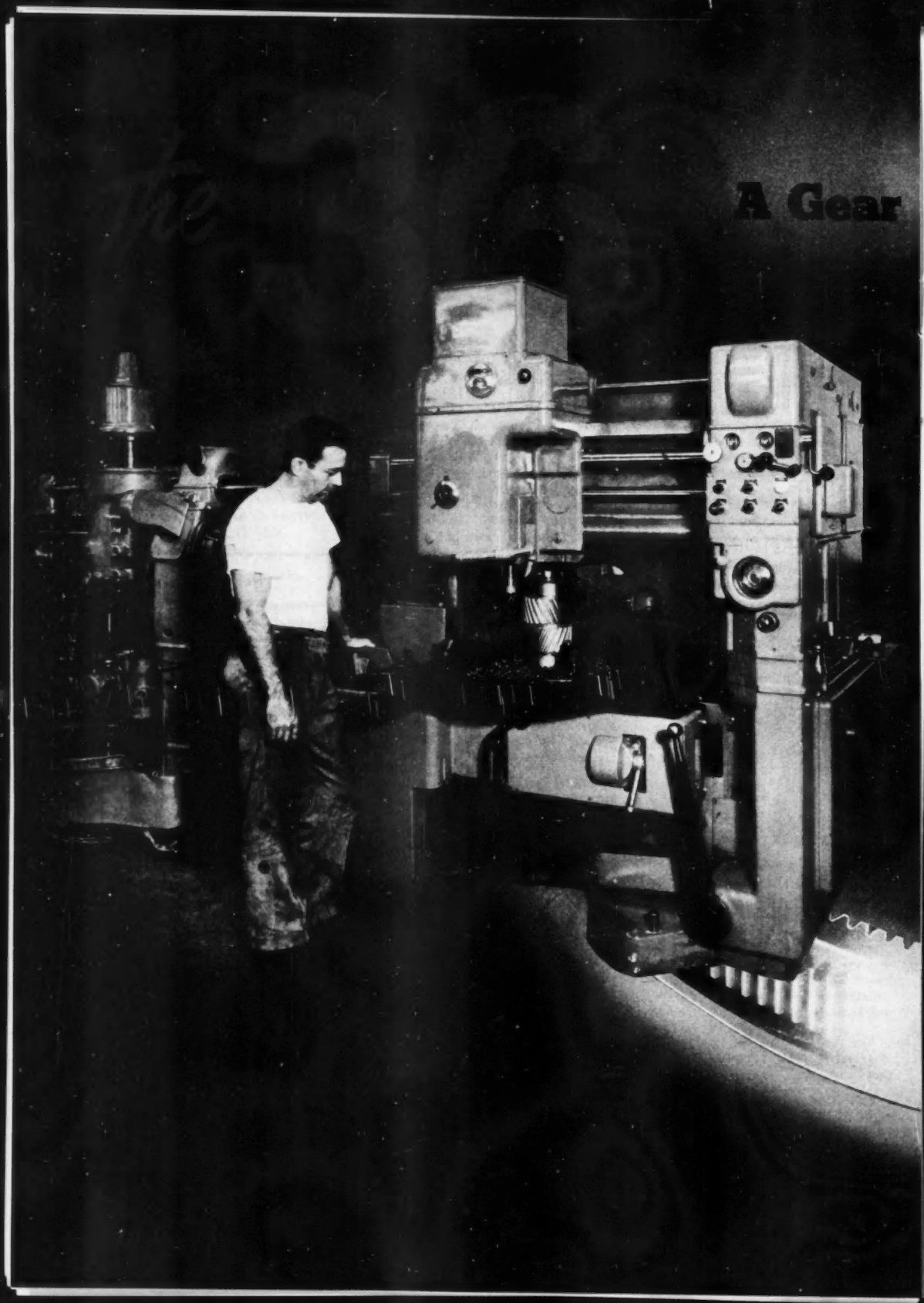
Ephraim W. Cleveland, 62, a vice president of the Cleveland Pneumatic Tool Co. and also a vice president and director of the Electronic Research Corp., was killed when his plane crashed near Seattle, Wash., on Aug. 8.

G. M. Haley, 48, director of purchases for the Chevrolet Div., General Motors Corp., was drowned in a lake near Bellaire, Mich., on Aug. 2.

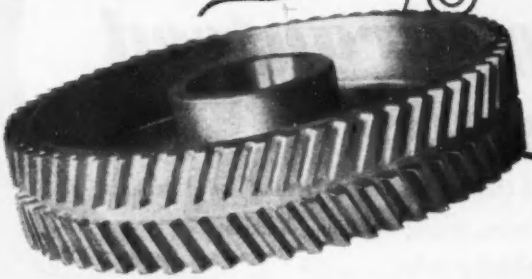
Wallace Tenney Montague, 63, vice president of Norton Company, died in Worcester, Mass., on July 30.

Fred C. Sibley, 59, manager of the Nash Motors zone in Boston, died July 28 in Boston.

Roycroft Walsh, 63, vice chairman and director of United Aircraft Corp., died Aug. 17 at Westerly, R. I.


A Gear

Shaper for HEAVY DUTY SMALLER GEARS

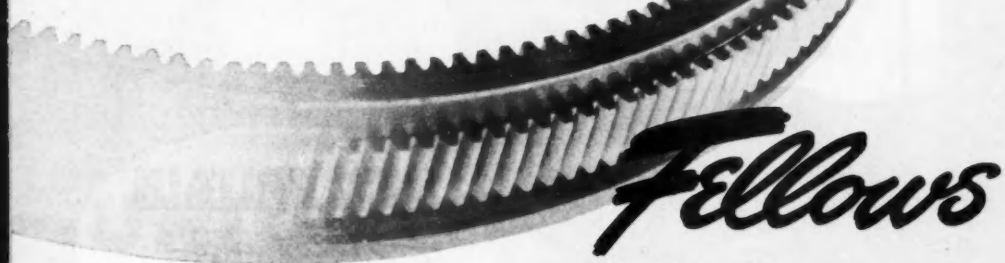


as well as those UP-TO-36" CAPACITY

May we emphasize, once again, that the 36-Type Gear Shaper *cuts small gears fast, too.* More machines are bought for roughing and finishing 8, 10, 12 and 14 inch gears than for the sizes closer to its maximum limit of 36" pitch diameter.

The secret of the ability of a 36-Type to cut costs—on the run of intermediate size work—as well as big gears—lies in its "beefed-up" design. You can take heavy cuts at high speed, and still hold to precision limits.

Wire, write or phone the Fellows Office nearest you when you have need to discuss ways of reducing costs on gear tooth machining operations.



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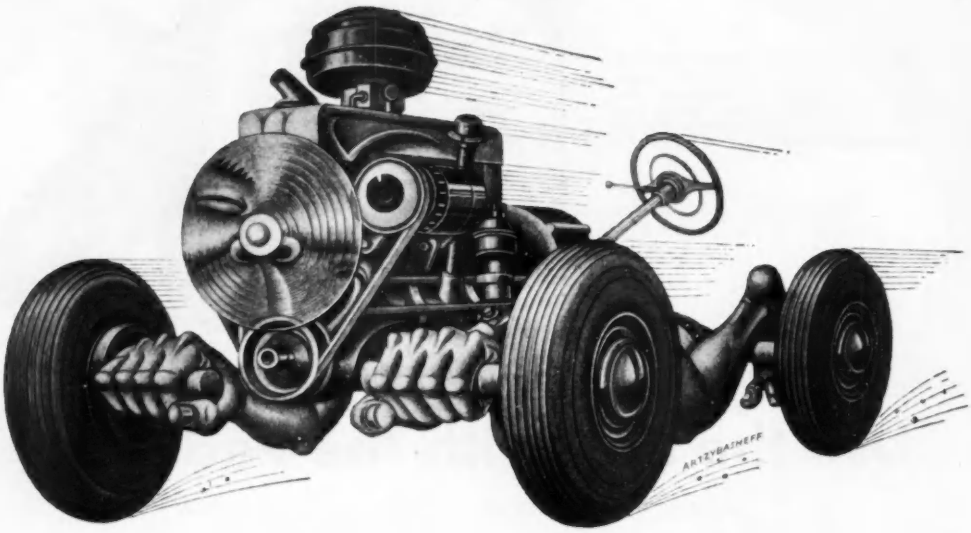

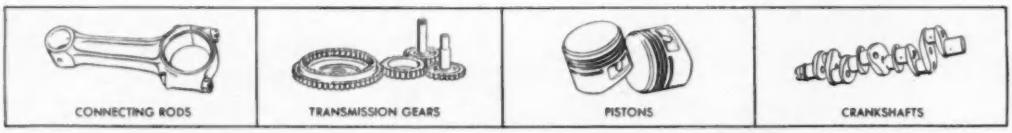

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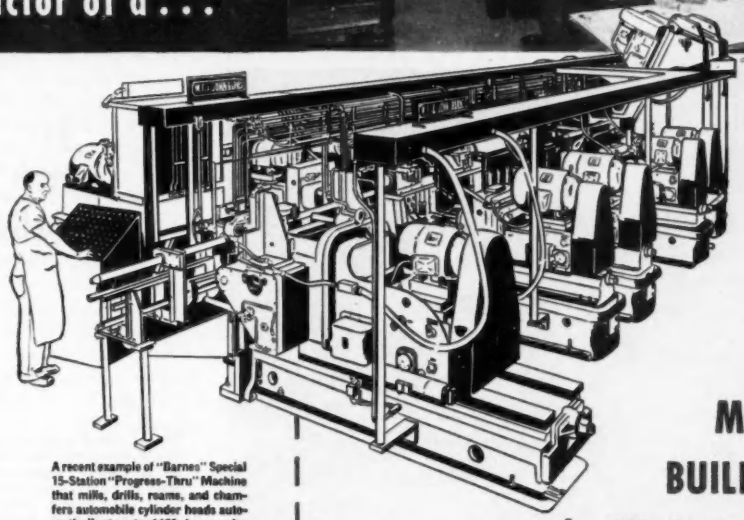
COORDINATED DESIGN and ENGINEERING important creative factor of a . . .

Partial view of Special Machine Engineering Department at Barnes.



A recent example of "Barnes" Special 15-Station "Progress-Thru" Machine that mills, drills, reams, and chamfers automobile cylinder heads automatically at a rate of 120 pieces per hr.

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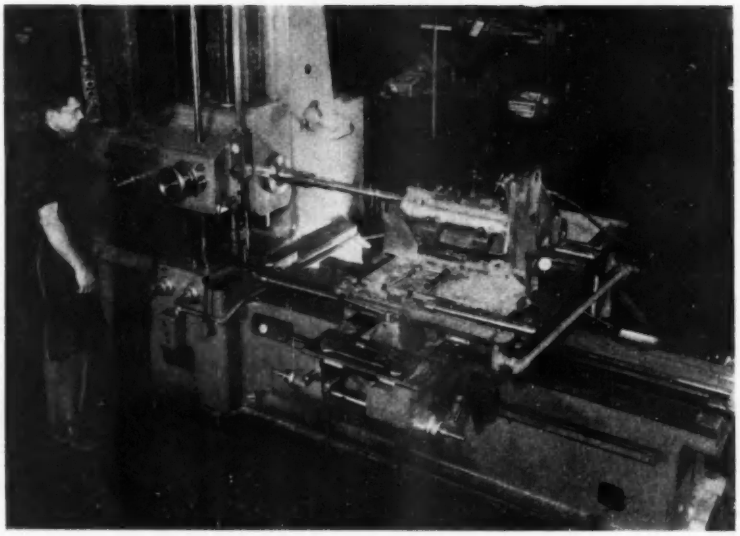
MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

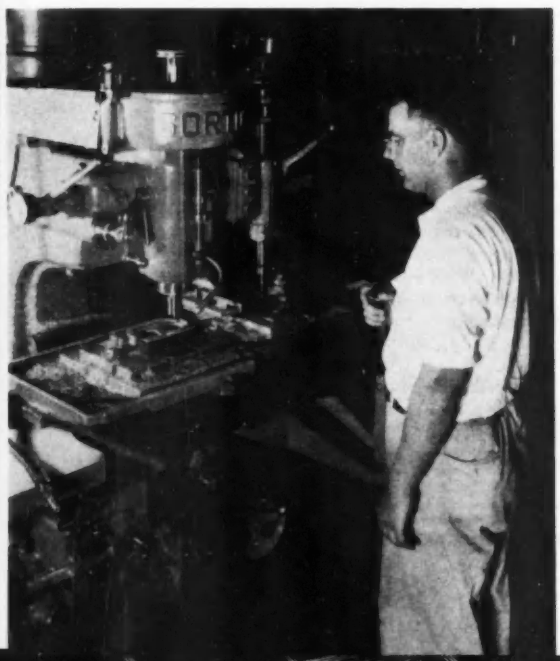
Close Tolerances a Must In Making Range Finders

By Joseph Geschelin



One of several versatile Lucas horizontal boring machines which serve as production machines in this plant in the machining of the telescope lower housing. They are employed for the line boring of the two long galleries—in rough and finish stages. The fixture seen here is of hinged design to present each bore to the boring bar.

Gorton duplicating machines such as the one seen in this view, are used for the gamut of profiling and grooving operations on a number of small parts.



MANUFACTURE of the T-41 range finder — a complex of precision optical, electronic, and mechanical systems — by the Ternstedt Division, General Motors Corp., for use in M-47 tanks, marks a notable example of some of the special tasks undertaken by automotive producers in the interest of harnessing production know-how to the gathering defense program. Designed and developed by the fire control division of the Frankford Arsenal, the T-41 instrument has been placed in mass production by Ternstedt, employing automotive techniques to assure maintenance of fine tolerances in the machining of component parts as well as of the complete assembly.

In addition to the T-41, Ternstedt will produce a new range finder for heavy tanks; while a letter contract already has been received for a completely new range finder now being tooled for production.

It is of interest that these range finders are being built in a GM dual-purpose plant, instrument manufacture being centered in a 300,000 sq ft area set

aside in the new plant of the Detroit Transmission Division of GM, producer of Hydra-Matic transmissions.

Assembly operations, currently under security regulations, are handled in air-conditioned rooms where temperature is held at 75 F and humidity controlled at 42 per cent. Employes wear nylon shirts or smocks to reduce lint in the optical assembly, adjusting and testing operations.

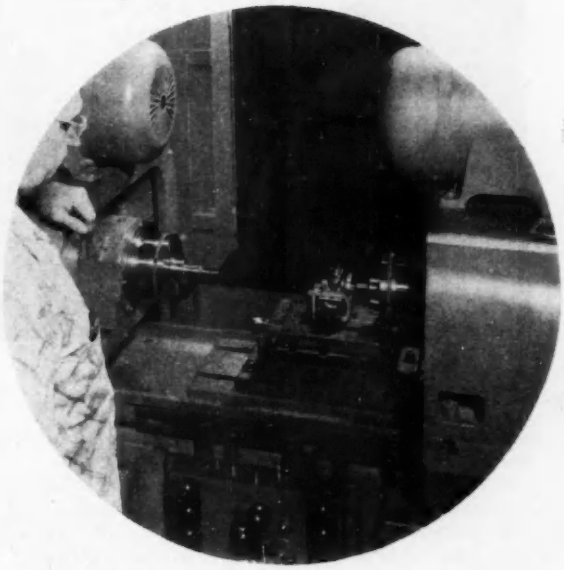
Even a sampling of machining operations emphasizes the enormous problems of production planning and tooling faced here because of the multiplicity of detail operations on each part, the need for extraordinary attention to tolerances, and the exceptional degree of axial alignment required of the component parts. Superimposed on these problems is that of maintaining fine tolerances on relatively long and slender parts.

To meet these conditions, the production organization selected makes and types of machine tools best suited for a given operation, developed fixtures and inspection devices of such character as to make it possible for relatively unskilled workers to handle the various operations without difficulty.

Ternstedt has a large battery of versatile Hardinge lathes in use here. One of these is unique because of an automatically operated lead screw attachment which makes it possible to cut a six-lead thread on the diopter adjustment collar in a single and fast, continuous cycle. This method is said to be superior to conventional methods of doing the same job.

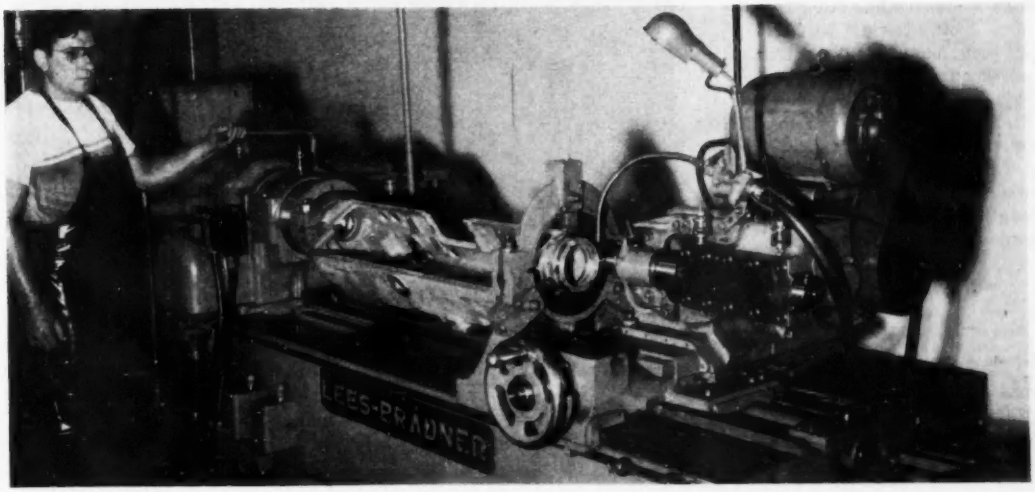
A large number of Gorton duplicating machines are employed for cutting closed circuit sealing grooves on many small parts, for profiling bosses and faces, and many other special operations of this nature. One of the exacting applications is that of cutting a rectangular lens seat in a bronze lens holder. Here the frame must be machined with great accuracy to hold the lens securely and in proper alignment.

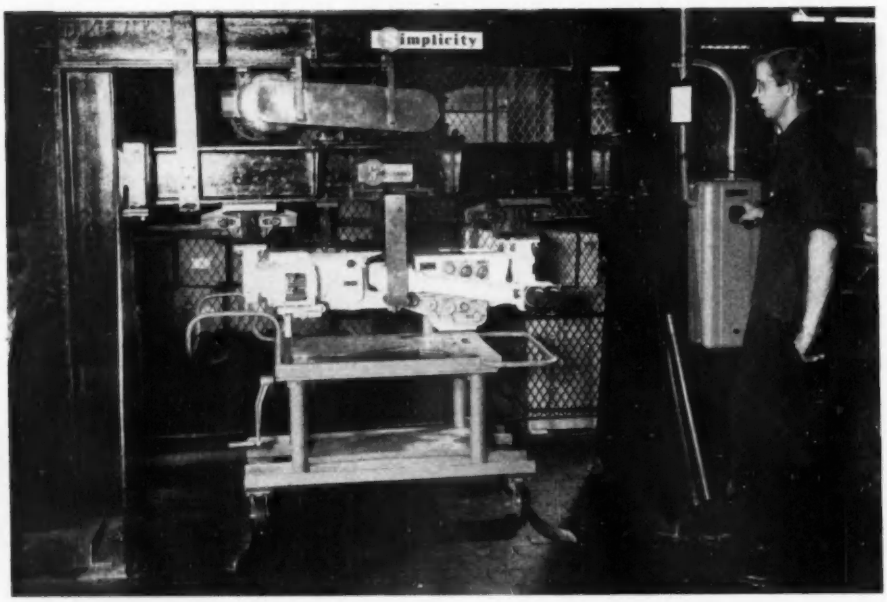
Although Lucas boring mills are familiar as tool room equipment, Ternstedt has adapted these machines for production operations on the telescope



Here is a close-up of one of the Ex-Cell-O precision-boring machines out of the large battery in operation in this plant. Ex-Cell-O's are used for boring, facing, and other operations on all parts requiring tolerances of the order of 0.0003 in.

The Lees-Bradner thread miller has worked out extremely well on the thread milling of one end of the main housing.





This is the Simplicity vibration testing machine for completely assembled instruments.

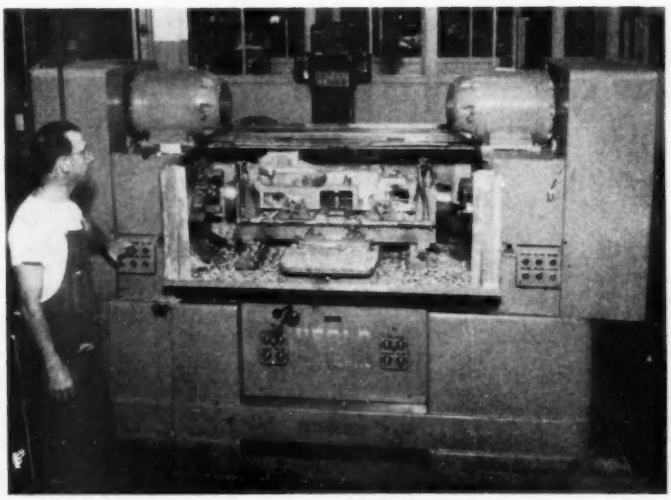
lower housing, a long and slender aluminum casting containing two stepped bores for the full length of the part.

Because of the fine tolerances on the bores, as well as the need for accurate alignment of bores, Ternstedt has added to the casting four large lugs which are suitably milled to provide accurate location in machine fixtures.

Each gallery is bored individually, the fixture being of pivoted or hinged design so as to bring each bore into proper alignment. Rough boring is done in one machine, then the work transferred to another Lucas mill where finish boring is done with a massive bar fitted with micro-tools. Boring bars are of such length as to permit piloting in the fixture bushing before the cutters are engaged. Finish-boring is held to a total tolerance of 0.001 in.

The main housing, an aluminum casting some 44 in. in length, requires an extremely large number of detail operations and entails heavy metal removal. On the average, the rough casting weighs about 60 lb. When finished, it weighs but 45 lb.

Preliminary operations, primarily on the cavity, are handled in a battery of Cincinnati Hydro-Tels. These are responsible for machining bosses, formed pads, gasket faces, etc. Not only are the various surfaces machined accurately to form, but the depth measured from the finished gasket face is held to 0.002 in. Despite the multiplicity of these operations, each piece is finished in one setting in a single machine. To this



Because of its length—44 in.—and the need for extreme rigidity during precision boring, the aluminum main housing requires the use of the large Heald Bore-Matic shown here (with machine guards retracted). Both ends of the housing are turned, bored, and faced to length in rough and finish stages.

end, each machine is provided with a suitable number of templates for the tracer attachment—nine in this instance. And each machine also is provided with a complete set of cutting tools which are changed for different operations.

Some impression of the preliminary study preceding development of the mass production methods now employed on the main housing may be gained from the fact the initial conventional method took about 25 hours whereas the current Hydro-Tel set-up completes the part in 5½ hours.

Following Hydro-Tel operations on the main housing, work is brought to the double-end Heald precision-boring machine shown here. In this machine both ends of the part are turned and bored, and faced to length in one setting. The machine is fitted with four spindles, two at each end—one pair for roughing, the other for finishing. The fixture is arranged for automatic operation—feeding the work to the roughing cutters first, then indexing over to the finishing station.

Another interesting operation on the housing is thread-milling of one bearing end. This is done in a Lees-Bradner machine, fitted with a lead screw, completing this precision operation in a very fast cycle.

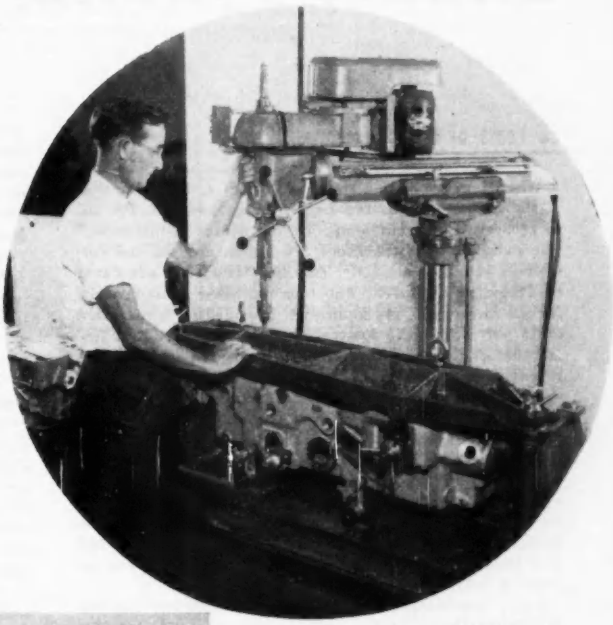
Drilling of small holes in many parts, including the large housing, is done with a large battery of versatile Walker-Turner radial drills. The housing, in particular, requires drilling of some 200 holes, most of them tapped holes and most of them blind end. Consequently, for this operation Ternstedt specifies special long shank drills fitted with individual stop collars.

A large battery of Warner & Swasey radial type tapping machines is employed for the tapping of the holes in the housing and other parts. These machines are fitted with individual lead screws and are particularly adaptable on jobs where it is more convenient to fix a heavy fixture and work in one position.

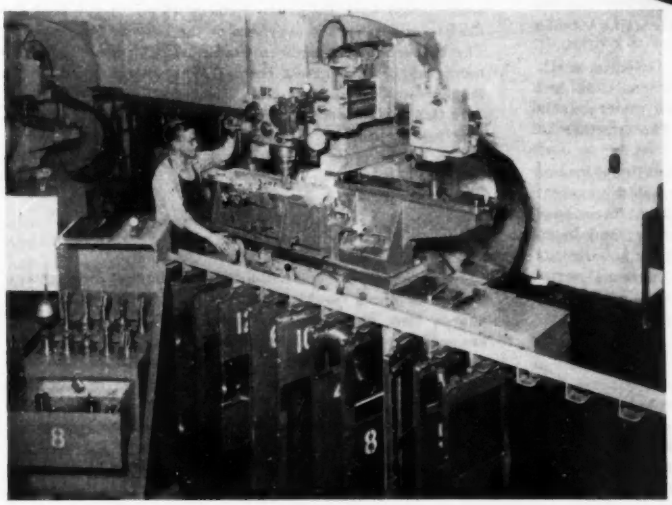
Kearney & Trecker milling machines, Cincinnati mills, and Warner & Swasey turret lathes are very much in evidence in various departments. There is also a large Ex-Cell-O department, fitted with precision-boring machines of single- and double-end types and set up for handling all manner of precision boring operations on a variety of parts. In fact, the Ex-Cell-O equipment is used on all parts where tolerances are specified of the order of 0.0003 in.

All of the parts used in this instrument—ferrous and non-ferrous—are given corrosion treatment and

(*Turn to page 78, please*)



A large variety of versatile Walker-Turner radial drills is found here. The setup seen in this view is for the drilling of some 200 holes in the main housing, mostly blind end holes for tapping.



Example of a Cincinnati Hydro-Tel operation on the cavity of the main housing. Templates for various operations may be seen on the rack directly in the foreground; while the special tools for each operation are in the rack at the left.

How Much Longer Can Our Freedoms Endure Adulteration?

20 Years of Fiscal Irresponsibility

When I entered the Senate on March 4, 1933, the title of the first bill I was required to vote upon was: "A bill to preserve the credit of the United States Government." The national debt was about $20 billion and the tax collections $4 billion annually. This legislation was advocated by President Roosevelt, who then indicated great concern for the solvency of our country. It provided for a reduction of 15 per cent in the Federal expenditures. Within a few months Mr. Roosevelt's alarm subsided, and the law was repealed. Our Government then began an orgy of Federal spending and waste which was intensified after Mr. Truman came into office. It is a period, I think, that can be properly labeled "20 years of fiscal irresponsibility."

If tax receipts under the Truman budget for fiscal 1953 were added to Truman taxes already collected, the total would be $339 billions for seven years. This is $45 billions more than the total of all taxes collected in all United States history, beginning with Washington and ending with Roosevelt—and Mr. Roosevelt, as you know, was no piker in either spending or taxing.

Today the Federal Government has 2,530,891 Federal civilian employes, and in March was increasing at the rate of about 500 a day.

This is bound to have been the greatest nation on earth. The systems and institutions of lesser nations could not have survived the abuses which ours have undergone in these 20 years of fiscal irresponsibility. The question is: How much longer can ours endure?

In 20 years a total of 25 per cent of our national income has gone into Federal taxes collected from us (the current ratio is 28 per cent); Federal expenditures have been equal to 30 per cent of our national income; and in 20 years we have piled up Federal debt which is twice as much as the assessed value of all real and personal property in America.

Something-for-Nothing Fallacy

It does not suffice to blame this entirely on war or depression. Taxes have been collected, the money has been spent, and the debt must be paid—whatever the purpose.

Actually, about half of these expenditures are charged directly to war, and the depression costs are small in latter-day comparisons. The remainder has gone in the main for 100 new Federal domestic spending programs and subsidies; for foreign assistance; interest on the public debt (the cost of which alone is now twice the total cost of all government in 1932); civilian payrolls; Federal grants to States and localities; loans to business; direct Federal payments to individuals and numerous others.

A startling increase has been made in Federal grants to States. In 1932 there were 19 Federal programs of aid to the States costing $250 million. In 1952 there are 48 programs of aid to the States with Federal payments of $3 billion—12 times as much in dollars and more than twice as many programs. These programs and figures do not include direct payments to individuals within the States.

Through these programs the Administration creates the illusion that we are getting something for nothing. Actually it takes money from us, gives back less than it took, and, in the process, exercises control of the States, localities, institutions and the lives of the individual. It is my contention that there is no such thing as a Federal grant. The Federal Government has nothing of its own to give away. The Federal Government has no money except what it collects from the citizens of the States. When it passes these funds back, they are reduced 15 to 20 per cent for the cost to finance the overhead of the Federal bureaucracy. The balance is sent back to the States and localities which must submit to controls from Washington as to how the money must be spent.

In this period there has been a moral and fiscal deterioration represented by the value of our money and the epidemic of corruption which inevitably follows centralization of power and purse.

Future Federal Deficits

When the President submitted his budget in January, he contemplated the 18th Federal deficit in 21 years. Next year a new generation will come of age under deficit-financed Government. In the 20 years to date there have been 14 peacetime years, and in these 14 peace years we have had twelve deficits. The fighting in Korea is included in the war years. This so-called police action is costing about $8 billion to $10 billion a year, and the end is not in sight.

Our present Federal taxation is crushing down upon individuals and industry. As a member of the Senate

By SENATOR HARRY F. BYRD (D-VA.)

This article, an abstract of addresses by Senator Byrd at recent meetings of the American Newspaper Publishers Association and the National Industrial Conference Board, analyzes the decadent fiscal and moral elements that have crept into the functioning of our Federal Government during the past two decades. It is presented here as a public service by AUTOMOTIVE INDUSTRIES.

Finance Committee for nearly 20 years, I am convinced that further tax increases, if imposed, will not only reach the confiscatory stage but will actually result in diminishing returns. This opinion is shared by such Congressional tax experts as my colleagues, Senator Walter George, the Chairman of the Senate Finance Committee, and Mr. Robert Doughton, the Chairman of the Ways and Means Committee of the House.

A constructive and non-political revision of our entire Federal tax system would be an incentive to our progress and would safeguard the solvency of individuals and corporations upon which the Government must rely for the high tax receipts essential to meet our future obligations.

In two of the three years the budget has been balanced, it was by inadvertence. It was not by economies. It was not by sacrificing anything. It was simply because the Administration planners under-estimated the inflation that followed the war. The years were 1947 and 1948. But, when these planners found out there was a surplus they quickly corrected it by starting another deficit, and now we have a deficit period in prospect that will shake our financial structure.

On the basis of the latest official estimates available, I submit the following "Byrd's eye view" of the Federal spendorama for the forseeable future:

FEDERAL SPENDORAMA

(A "Byrd's" Eyeview)

(in billions)

Year	Expenditures	Revenue	Deficit
1952	$67.0	$61.5	$5.5
1953	80.0	68.5	11.5
1954	78.0	69.0	9.0
1955	76.0	68.5	7.5
1956	75.0	68.0	7.0
1957	75.0	68.0	7.0
Six Year Total	$451.0	$403.5	$47.5

On the basis of this projection, it is indicated that with no more war than we have at present the Federal debt by June 30, 1957, will exceed $300 billion.

The Flames of Inflation

If we cannot balance the budget now in this day of high prosperity, I ask you: When can we balance it?

Are conditions going to be better next year, or the following year? If we deliberately start another prolonged period of deficit spending, will we ever balance the budget again? That question cannot be answered until after the election of the next President of the United States.

Only a strong and very determined President who has the conviction that the foundation stone of democracy is the maintenance of the national credit, and a sound currency, can bring stability to our Federal fiscal jungle.

For nearly 20 years we have been on a spending spree in this country. Now it seems to me the stage has been reached where we are either going over the brink or turn around. There isn't much time, one way or the other.

Another series of great deficits will light anew the flames of inflation, especially with the inflation spark on another front when the President exercises his God-given right personally to fix the wages of the steel employes, fix the price of steel, and then determine the issue of the closed shop. But let us not be disturbed, as all of this is being done "in the public interest."

This personal usurpation of power is a cap-stone upon that power which is inherent in the breakdown of the legislative budget control and the Federal expenditure of billions of dollars a year, along with that which is derived from scores of Federal give-away programs which subsidize States, business, agriculture and individuals.

Centralized power and purse breeds a sinister political philosophy which scorns frugality, efficiency and integrity; which attaches no importance to waste, debt or immorality; which advocates indefinitely the political formula of "tax and tax, spend and spend, and elect and elect;" and which has no scruples against using public money to influence political decisions.

You may not believe it, but for all the vast Federal bureaucracy to which is entrusted so much of our freedom and treasure there is not a single Civil Service regulation against the waste of money, material or space. To me deliberate waste is a dreadful thing, and public waste is the most dreadful of all because it is a breach of trusteeship. Nothing is so difficult to contend with—nothing is so utterly demoralizing and ruinous. In public affairs it is easy to start and hard to stop. (*Continued on next page*)

How Much Longer Can Our Freedoms Endure Adulteration?

. . . (continued) . . .

Venality in Government

This nation is now cursed with waste in public administration to an unprecedented degree and unparalleled extent. It is another product of big Government. It permeates the whole governmental structure. Scarcely any agency is free of it. Just as waste is inherent in centralized power and purse, so also is corruption inherent in this trilogy of power and purse and waste.

I am firmly convinced that the venal conditions at Washington are directly attributable to the concentration there of power with the resulting waste which has reached such astronomical proportions in the last 20 years. I can document this statement completely. To my mind this venality is in three parts.

One part is that which is illegal and criminal. This is bad enough. But penalties attach and when the culprits are caught they can be tried and convicted.

The second part is worse. It involves those who are able to exploit within the law public trust for private gain. To me every dollar collected in taxes, and every power delegated to a government is indelibly impressed with a public trust. Those who take the position that venality in public office is proper unless it is illegal are the lowest form of political predators. Those who have peddled influence and favors in connection with Government contracts and loans and other forms of Federal favoritism, and still remain out of jail will never themselves be influenced by any code of ethics hanging on the wall.

The third party of venality in the Washington administration is the worst of all. It is in the form of amorality. This sets in when we are so hardened by all that we observe around us that we are no longer able to distinguish the moral from the immoral.

When Mr. Newbold Morris arrived he was supposed to be the Hercules to cleanse the Augean stables at Washington, but he could not survive the political weather. Even before he got into action he was summarily dismissed "for the good of the service."

We cannot hope to preserve our freedoms, our liberty, our form of government, and the free enterprise system upon which all these depend, unless we restore integrity to government. A government without integrity is a government without confidence or respect. Our free enterprise system is based upon confidence in fiscal soundness. Our system of government by law—not man—is based upon respect for the institutions which administer the law.

The essence of freedom, under our American democracy, lies in our system of checks and balances. Within the Federal Government, checks and balances are provided through a three-branch system—the Executive, the Legislative and the Judicial. Beyond this, still other checks and balances are provided in our system of State and local governments, which lie closest to individual citizens from whom all governmental power and authority is derived. Our democracy has been given vitality by our system of competitive free enterprise, which, to this point, has made us, through individual initiative, the greatest nation on earth. I stand for this system, with the absolute minimum of governmental shackles. Our four foundation stones are freedom of religion, freedom of speech, freedom of the press and last but not least, fredom of opportunity to the individual under the competitive enterprise system.

More Socialism for America

There are those who believe that socialism can be turned on and off as if it were water flowing through a spigot, and there are those who profess to believe we can have a little socialism and remain free. For those who think "a little socialism" is a good thing, there is the British example. From what we see in England, we would be the most stupid nation on earth if we allowed ourselves to become further embraced by the socialism which has been creeping upon us. Socialism and free enterprise cannot live together.

As I see it, the welfare state, about which we have been hearing so much in recent years, is that state of twilight in which the glow of democratic freedom is fading beyond the horizon, leaving us the blackness of socialism, or worse.

Mr. Truman says it is an insult to the intelligence of the American people to say this country is on the road to socialism. I submit that it is an insult to our intelligence to assume that we do not realize that adoption of the President's program will commit us irrevocably to a socialistic state, from which there can be no retreat.

If the President is against socialism, I ask him:

Why does he continue to pressurize Congress to adopt socialized medicine? He sent Oscar Ewing, at public expense, to England to get the "low-down" on their socialistic system for propaganda use in the United States. If the President does not recognize that the British experiment in medicine is socialism, he could inform himself from the debates in England during the last election. The President calls his plan national health insurance, but it is socialized medicine just the same.

If the President is against socialism, why is he advocating the Brannan Plan, which inevitably means socialized agriculture? This plan not only would contribute in a huge way to the bankruptcy of America, but would create such chaos in the production, sale and distribution of food as to make it necessary for the government to take over these functions that must remain competitive in private hands. President Truman and Secretary Brannan are responsible for a nationwide campaign to force the Brannan Plan through Congress, notwithstanding the fact that the great farm organizations such as the American Farm Bureau Federation and the National Grange, as well as most of the farmers of this country, are bitterly opposed to this plan. They realize it would end free enterprise in agriculture.

The only sincere thing Mr. Brannan has said about the plan is that he could not estimate the cost of it. Testifying before a committee of Congress, he gave this glowing picture of what the Brennan Plan would do—reduce the cost of food to the consumer, pay the farmers a high profit for what they produce—but he did not fill in the gap by telling how the Federal Government could obtain the vast sums necessary to pay for the difference between food at low cost to the consumer and high prices to the farmer.

If President Truman is opposed to socialism, why is he advocating another extension of socialized housing?

These three proposals alone would mean socialization of your health, your food, and the roof over your head. If time permitted many other trends to socialism could be cited. If the President is opposed to socialism, why is he constantly advocating an extension of the number of those who receive payments from the Treasury of the United States? Today, there are 17 million Americans receiving regular payments directly from the Federal Government, and eight million more are on the rolls of counties, cities and States. These 25 million, with their families, constitute a substantial part of our population.

Constantly increasing those who are on the public payroll effectively promotes socialism. A population of government dependents is a socialized population. Among the cardinal characteristics of socialism are government subsidies with controls, and government doles with regimentation. I am against that.

The American system, operating in the fullest freedom of democracy, stimulates individual initiative to the development and production of more of what we need, in peace or war, at a cost we can more easily afford from the earnings of our endeavor. I am for that.

Free Enterprise Creates More Freedoms

The free enterprise system is the system which, in the relatively short span of 160 years, has brought us from the impotency of 13 un-united colonies to our present position of world leadership. I do not concede that it should be scrapped for socialism in welfare state clothing which never brought greatness, happiness or security to any nation.

The American system has developed individual freedoms under constitutional democracy to the fullest measure ever known to man. It is the system which is always ready to supply the vital spark needed by the deserving to expand mediocrity into genius. It is the system which supplies the incentive to every American to start at the bottom and rise.

It is the system which enables us with only six per cent of the world's population to out-produce the rest of the world combined. It is the system which produces steel, the prime requirement for military defense, at a rate of more than two tons for every one produced by the rest of the world—more than four tons to every one made by Russia.

I challenge the socialists to offer a practical substitute for the American system's capacity to hold Russian world aggression at bay. Our free enterprise system is the greatest deterrent in the world to Russian aggression. It is this system which is our first line of defense. Our armies, navies, and air forces are merely the tools through which the strength of this system is applied in war. With our eyes wide open, will we yield to the ever-increasing socialization of those freedoms and institutions which are vital to our democratic free enterprise?

The thing that is most inflated in America today is the Federal Government. Big government costs big money. Inflation is conceived and born in Washington. Only the Federal Government can spend in unlimited amounts. It alone determines the value of money and the extent of credit, because it alone is legally empowered to do so. A Federal bond is a first mortgage on all property owned by every American citizen.

Today we have conditions confronting us such as we have never before experienced. We are faced with the threat of war, and this may continue for many, many years. All the world is looking to us for leadership, and money—more especially the latter.

There has never been a time when we should exercise greater wisdom in mapping our course. We should tighten our belts for the long, hard pull ahead. Until world conditions change it would be tragic if we did not maintain an adequate world military power. We must keep ahead of Russia in military invention and scientific progress. This I believe we are doing. Our Air Force must be overwhelming as compared to Russia. We must continue to control the seas. Our Army must be adequate.

All of this I feel confident we can do but only if we require more efficiency and less waste and the complete elimination of non-essential spending.

We must likewise do our share to arm our Allies who are menaced as we are. Common prudence should compel us to husband our resources to meet whatever contingency the future may bring forth.

Recruits for Freedom

I do not concede that either democracy or free enterprise, or any other American freedom has run the course of its usefulness in the world. They have been worth fighting for in the past against both economic and military challenge, and I do not concede that they were any dearer to those who have fought and won before than they are to us today. The battle lines are drawn. THE FORCES OF FREEDOM IN AMERICA NEED RECRUITS.

We must demand that short of total war our Federal budget be balanced. We must not ask for "pet" Federal appropriations, but demand that the President and the Congress keep the Federal spending within the ability of the people to pay. Let us all recognize that we cannot pyramid deficit after deficit on an existing Federal debt of $260 billion and survive as a democracy.

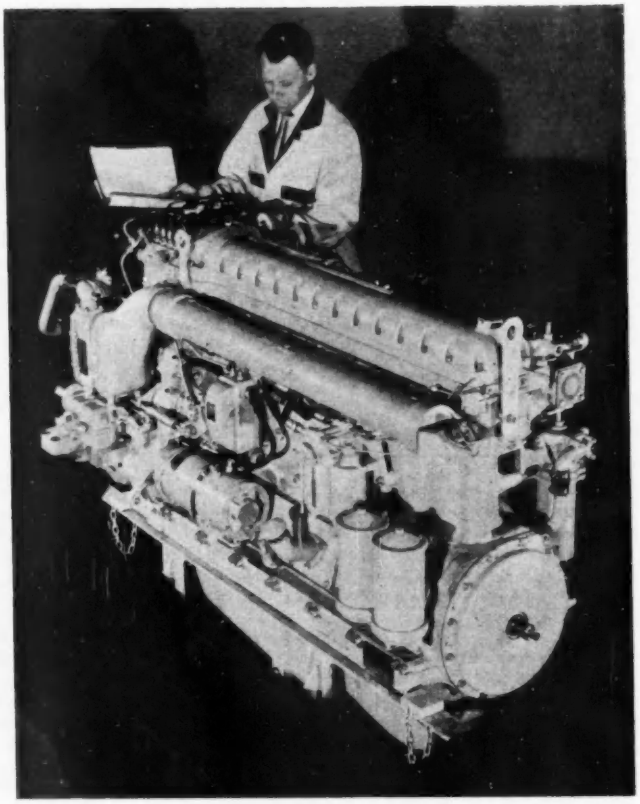
Once the American dollar goes down, we will enter an age of international darkness. It is the only currency that everybody, everywhere in the world, has confidence in.

Those who, wilfully or otherwise, would destroy the American system would destroy the freedoms of people everywhere. Today, we alone are bearing the standard. What nation can carry it if we fail? Without its light, freedom and progress would perish from the earth. We must not fail.

Without American solvency there would be no deterrent to communism abroad. In the existing circumstances it is no exaggeration to say that there is literally nothing on earth more important than the preservation of the fiscal and moral integrity of the Federal Government of the U.S.A., and the freedom upon which our Republic was founded.

We should always remember that human freedom is not a gift to man—it is an achievement by man, and, as it was gained by vigilance and struggle, so it may be lost by indifference and supineness.

Packard Marine Diesel



The six cyl. model which has a continuous duty rating of 300 bhp. Its piston displacement is 852 cu in., and its compression ratio is 15 to 1.

TANGIBLE and physical evidence of the influence of lightweight aluminum construction on the design and performance characteristics of large automotive type Diesel engines is found in the family of Packard Series 142 Diesel engines being built by Packard Motor Car Co. for the U. S. Navy. Watercooled and operating on the four stroke cycle, these engines will be available in six-cyl and 60 deg V-12 models, equipped with G.E. turbochargers at the start of production. Later on Packard anticipates production of V-8 and V-16 models of the same type.

Although the engines to be described here are of marine type, designed to meet Navy requirements of light weight, high speed, and high performance with maximum interchangeability of parts, it is not unlikely that at the proper time, when military needs have been satisfied, this family of engines may well be groomed for normal marine service, for motor trucks and buses, off-highway vehicles, industrial power, and the gamut of other useful civilian applications.

Some impression of character of these engines may be gained from the following basic statistics: specific weight of the six-cyl engine, complete with accessories —7.34 lb/bhp; specific weight of the V-12 is only 5.41 lb/bhp. Specific output for both six and V-12 is 0.352 bhp/cu in. Specific fuel consumption based on dynamometer tests is of the order of 0.4 lb/bhp-hr, some tests showing even lower values. Overall length of both engines is approximately 85 in.

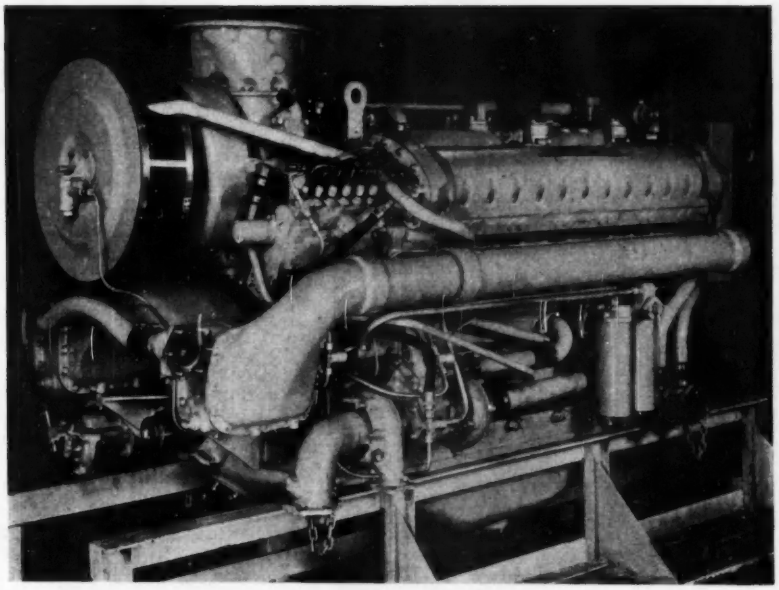
This family of engines is based upon a standard cylinder design of 142 cu in. displacement, common to all engines, and having major elements interchangeable. Among these are the following: cylinder head and wet liner assemblies; intake and exhaust valves; pistons, pins and rings; camshaft and main bearings; fuel injectors; individual fuel pump assemblies; and numerous minor parts. In addition, the crankshaft is interchangeable on both the six and V-12.

Common to all engines is the basic combustion system embodying a spherical precombustion chamber in the cylinder head, located directly over the center of the piston. This chamber communicates directly with the main combustion chamber through a replaceable multiple orifice. The pintle type injection nozzle sprays fuel directly into the precombustion chamber. This arrangement makes possible lower fuel line pressure and lower combustion chamber pressures.

Engines

By Joseph Geschelin

feature Aluminum Construction and Interchangeability of Parts



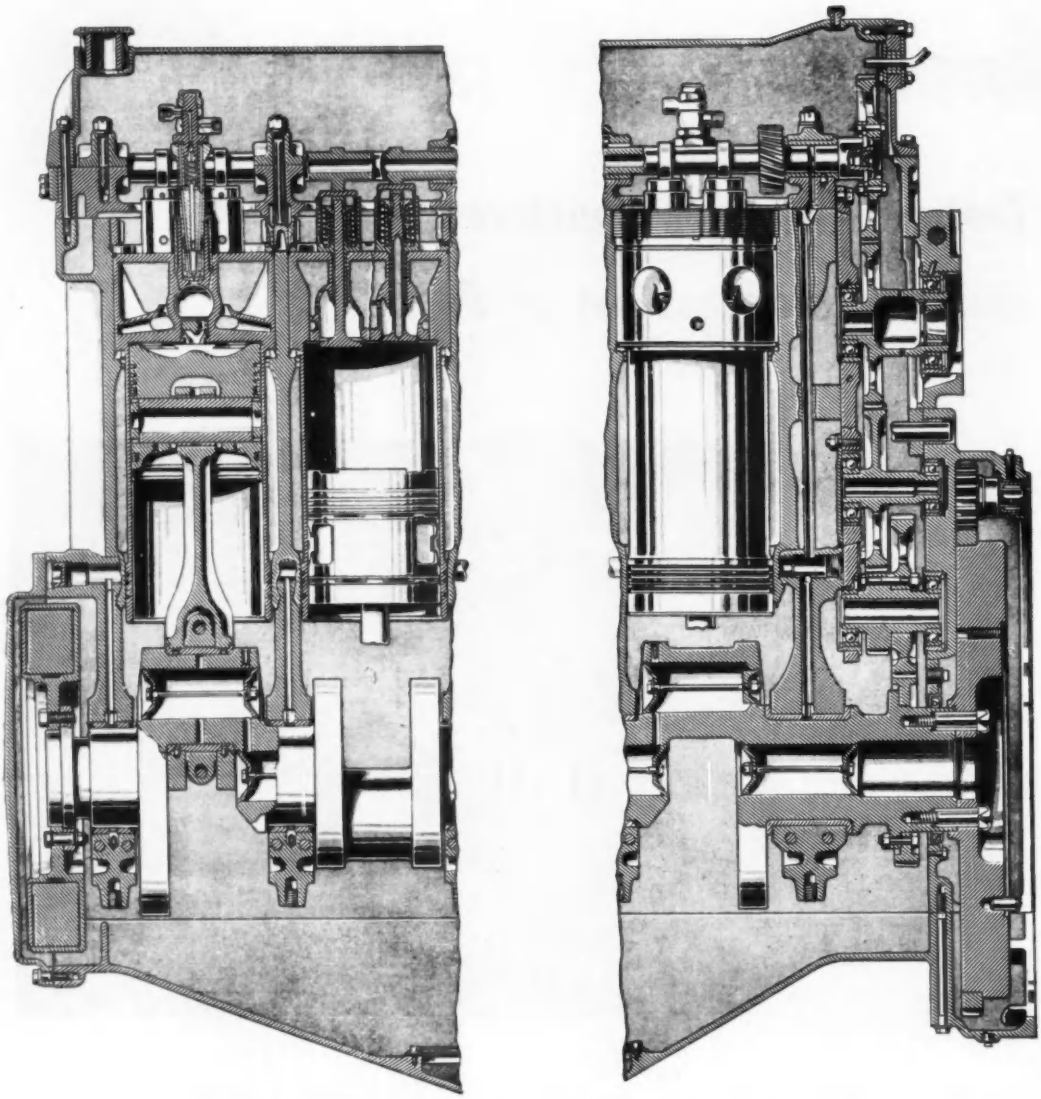
This view of the V-12 model shows arrangement of the water pumps, turbocharger, manifolding, etc.

Another basic requirement for Navy service and equally salutary for commercial applications is the provision for ready removal and replacement of most accessories. It will be noted from the illustration that major accessories are mounted on the side of the crankcase and can be removed individually by disconnecting the service lines. In addition, access doors are provided in the crankcase deck for inspection within the crankcase area.

The basic cylinder assembly is common to both the six and V-12. In each instance, the cylinder is fitted with four symmetrically located valves—two intake and two exhaust—the latter being salt-cooled. In each case there are two camshafts per cylinder bank—one for intake, the other for exhaust. Valves as well as valve seats are Stellite faced, making for extremely long life, and reducing service operations.

Valve spring arrangement is quite unique and noteworthy. In the first place, it will be noted that the nested valve springs are continued within a chamber which is integral with the valve guide. This interchangeable part is a casting made of pearlitic malleable. Fitted over the valve springs is a barrel type tappet sliding within the valve guide barrel and communicating with the camshaft. Under the inner face of the tappet and fitting over the end of the valve stem is a small button designed to provide for proper tappet clearance. These buttons come in different thicknesses to make up for variations in the assembly.

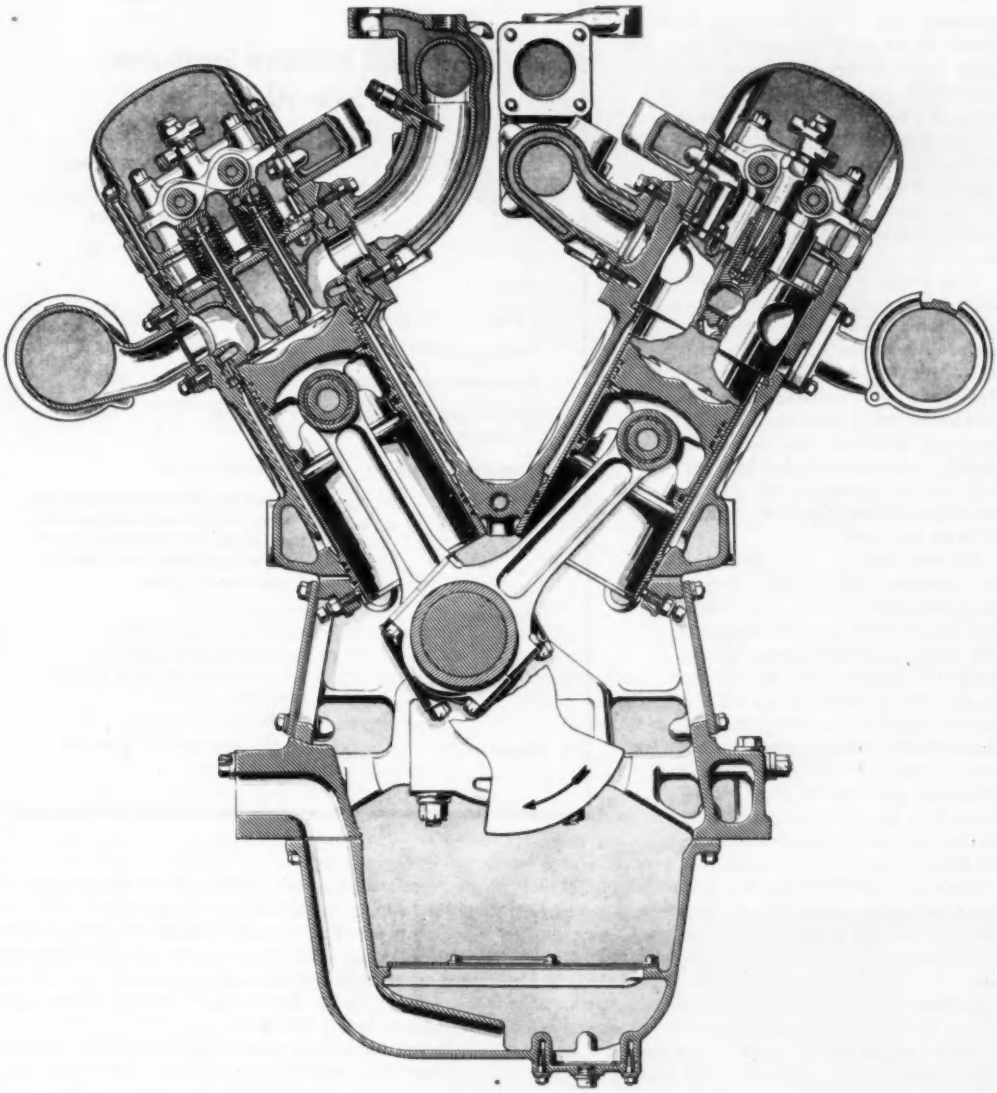
The cylinder head, as shown in the cross-section of



Longitudinal sectional view through two front and one rear cylinder of the V-12. The timing gear arrangement is a projected section showing the gearing for one bank.

the V-12 assembly, is another unique element. It is a cylindrical precision-cast steel casting cored accurately to size, as in permanent mold casting practice, with exact porting and a precisely-cast spherical precombustion chamber which requires no further machining. It is noteworthy that the long wet liner is seam-welded by the submerged arc technique directly to the cylinder head to produce an integral assembly, readily removable and interchangeable on all cylinders. The liner is nitrided to provide hardness and durability.

The cylinder head is fitted within the bore in cylinder block and is held securely by means of a large threaded plug which may be seen at the top of the cylinder assembly. The plug contains internal serrations to facilitate assembly and disassembly by means of a small hand gear drive. It is also of interest that a firm, durable thread in the aluminum casting is obtained by the introduction of Helicoil inserts. A



Transverse sectional view of the V-12. Many of the parts, such as cylinders, heads, valves, pistons, rings, and piston pins are the same for the six cyl engine.

steel spacer between the threaded plug and cylinder head makes up for variations in assembly tolerances.

At its lower end the liner is adequately sealed against leakage of water and lubricant by means of three Neoprene gaskets. Between the second and lower of these gaskets is an annular groove to permit drainage of fluid, if any occurs, directly to the outside of the crankcase wall through the drilled passage seen in the transverse sectional view, directly above.

Pistons are of massive design, made of aluminum alloy forgings, provided with a specially-formed cavity in the thick head which serves as a turbulence combustion chamber. As illustrated, the piston is fitted with five rings. The top three are compression rings, the top ring being chromium-plated. The fourth and fifth rings are special tapered oil rings, the fifth one being located in the lower end of the skirt.

Connecting rods are the only major elements of the

assembly not interchangeable between the six and V-12, although the main bearings are interchangeable. Connecting rods for the V-12 are of blade-and-fork type similar in design detail to that of the gasoline marine engines built for Navy PT's during the last war. This construction was so successful that it has been continued in this new series for V-type engines.

It is noteworthy that crankshafts for both the six and V-12 engines are interchangeable. Crankshafts are of drop-forged alloy steel, nitrided to provide adequate durability. They are of seven-bearing type, counterweighted, as shown, and dynamically balanced. The Houde viscous fluid damper, adopted by Packard for its passenger car engines immediately after the war, is fitted on these engines.

As mentioned at the outset, this is a family of light-weight engines, using aluminum at every point where this light metal can be employed. The massive combination cylinder block and crankcase for both six and V-12 is an integral casting of aluminum. In the V-12 transverse sectional view, note particularly the heavy sections at the cylinder head mounting and the heavily ribbed lower deck for supporting the main bearing line, providing for enormous rigidity of the entire structure.

Condensed Mechanical Specifications Packard Series 142 Diesel Engines

	Six	V-12 (60 deg)
Type	Four stroke, compression ignition, with precombustion chamber	
Bore (in.)	5⅜	5⅜
Stroke (in.)	6¼	6¼
Displacement (cu in.)	852	1704
Compression ratio	15 to 1	15 to 1
Rated speed (rpm) continuous	2000	2000
Rated bhp, continuous duty (supercharged)	300	600
Bmep, continuous rating	140 psi, supercharged	
Power take-off	Flywheel and flywheel housing on engines with gear boxes and generators Hydraulically operated reverse gear for marine installations, with reduction gears where required	
Accessories	Governor Electric or air starting motor Coolant circulating pump Sea water pump for marine engines Fuel filter Air cleaner	
Weight (lb)	2200	3250

Following previous practice, additional rigidity is imparted by the use of through-bolts—which may be seen in the lower section of the crankcase—extending from bosses on each side, through the main bearing caps.

Continuing the round-up of aluminum parts, the oil pan is of aluminum, and so are the intake and exhaust manifolds, valve covers, timing gear case, accessory housings, supercharger, and a variety of other parts. In short, everything is of aluminum except such functional parts as must be made of steel. From that standpoint the family of 142 engines can be appropriately termed all-aluminum engines.

As mentioned earlier, these engines feature a spherical precombustion chamber to which fuel is fed by pintle type fuel injectors. Fuel injectors are supplied by American Bosch, fuel being timed and distributed from American Bosch multi-plunger fuel pumps. To effect complete interchangeability, the fuel pumps are of six-cylinder type—one being used on the six, two on the V-12; in the latter case one pump is mounted on each cylinder bank. These fuel pumps include a special feature in the form of a plunger rack positioner which automatically sets the stroke and timing for best starting with the rack in the initial position.

Fuel supply is regulated by a hydraulic governor to maintain specified constant engine speed throughout the load range. The governor is mounted externally and apart from the fuel pump assembly. The installation also includes an overspeed trip governor as an additional safety feature.

Use of the precombustion chamber aids in reducing primary fuel pressure in the lines and in the injectors. Ignition is initiated and peak pressure maintained within the precombustion chamber, thus making for lower pressure levels in the main combustion chamber where the gases mix with the compressed air charge. The multiple orifice jet from the precombustion chamber is designed to eject a high velocity jet directly onto the center of the piston dome. Here the dispersing cone causes the jet to mushroom and thus provide the turbulence essential to complete and clean burning of the fuel.

Peak pressure in the main combustion chamber is lower than that in the precombustion chamber and occurs later in the cycle. This time delay is said to facilitate both light-weight construction and quick

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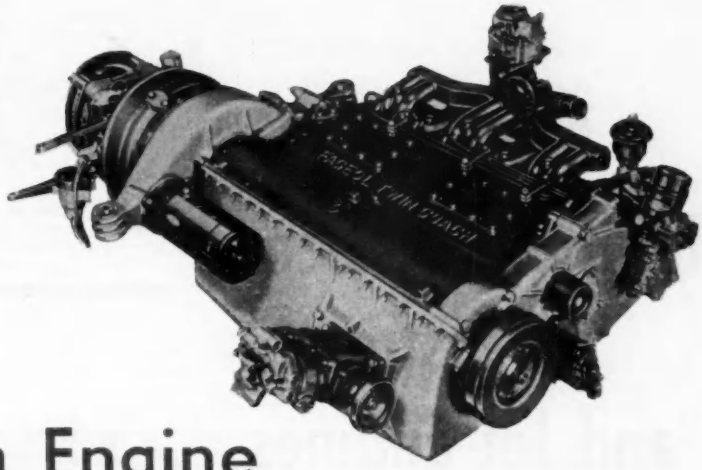

The Fageol 200-hp aluminum engine which is designed to meet military requirements.

Fageol Aluminum Engine Designed for Military Use

THE Fageol 200-hp Model F-200 aluminum engine, which is designed in accordance with military requirements, is an adaptation of the Fageol Products Company's standard high-speed, 200-hp automotive engine. While the use of aluminum enables the engine to meet weight requirements, threads tapped directly into this metal would not have sufficient strength to withstand the torque loadings necessary in assembling the engine.

In addition, some parts of the engine require periodic disassembly for inspection or adjustment. It was anticipated that frequent removal of inspection plates would accelerate the wear of aluminum threads.

For the answer to these problems, Fageol engineers considered use of stainless-steel thread inserts manufactured by the Heli-Coil Corp. of Danbury, Conn. and decided to use them in four critical locations: the block, the chain housing, the distributor housing and the cylinder head.

In the block, where strength was the primary consideration, 14 ½-13 stainless-steel helical thread inserts were specified. These inserts reinforce bolthole threads used in securing the bell and chain housings to the block. The bell housing serves its normal automotive function while the chain housing encloses the mechanism for driving oil and water pumps as well as the camshaft and distributor. Reinforcement of threads was necessary at these points because the unprotected aluminum threads could not withstand the 95 to 105 lb-ft installation torque required to mount these housings securely.

Both the distributor and chain-housing cover plates require periodic disassembly for inspection and adjustment. Thus the aluminum threads in the distribu-

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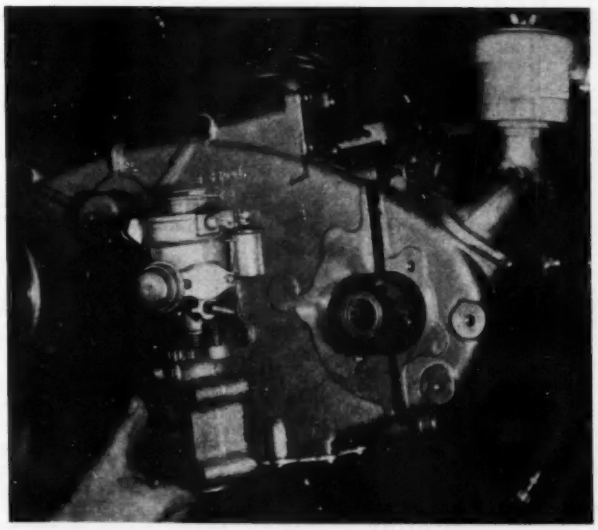
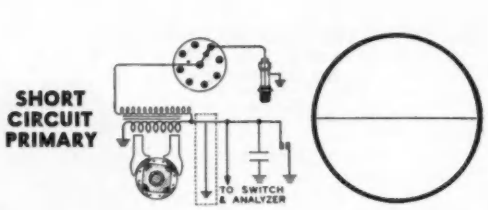
Periodic removal of inspection cover plates on chain housing and distributor drive housing is facilitated by use of wear-resistant thread inserts.



Analyzing Ignition Problems Of Piston and Jet Engines



Possible cause — direct ground on insulated side of primary circuit (illustrated within dashed line), breaker points not opening, grounded lead between magneto and switch.

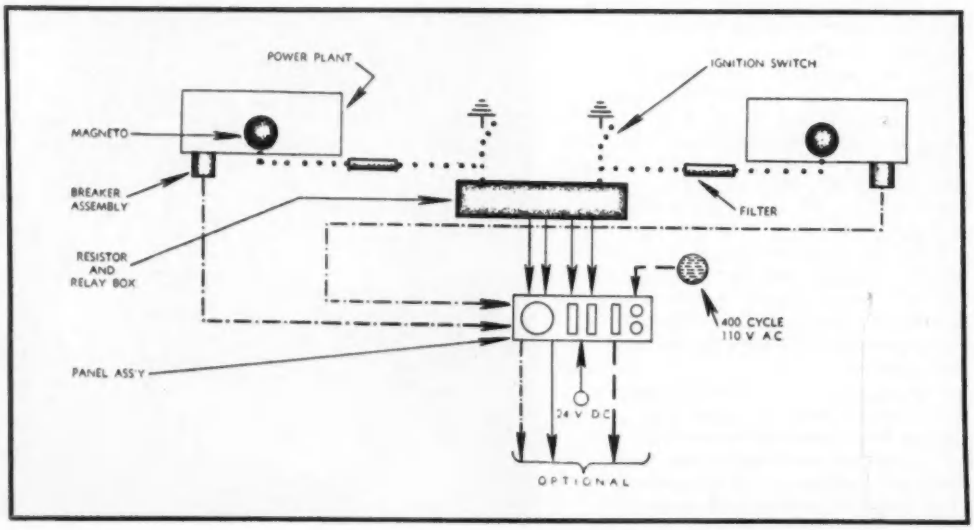
By Thomas Mac New

INDUSTRY, military and Government aircraft technical personnel met recently to confer on aircraft ignition analyzation problems in respect to using oscilloscope type analyzers. Sponsored by Scintilla Magneto Div. of Bendix Aviation Corp., the conference did much to foster aircraft safety by demonstrating how engine performance can be checked by the use of ignition analyzation equipment. It was pointed out by Ralph S. Damon, president, Trans World Airlines, who was the principal speaker at the meeting, that aviation's safety record has improved 50-fold in the past 15 years and that conferences such as the one on the analyzer were a great asset in the furthering of that safety record.

The ignition analyzer, which is currently being used for commercial and military craft is an adaptation of the laboratory oscilloscope. Its function, as used for engine analyzation, is to provide a permanent or portable unit that is capa-

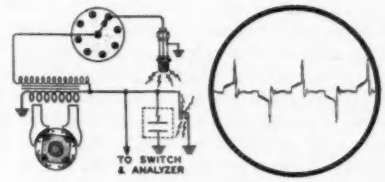
Wiring diagram below is of a typical ignition analyzer installation and is for either a portable-airborne or airborne setup. If a portable-airborne installation is desired, the three leads will be terminated in a lead storage locker. If an airborne installation is desired, the three leads will be terminated in a permanently installed ignition analyzer. The legend of the wiring is as follows:

—.—.—. analyzer synchronizing circuit;
— — — — analyzer power circuit;
. . . . . airplane ignition circuit;
——— analyzer primary circuit.



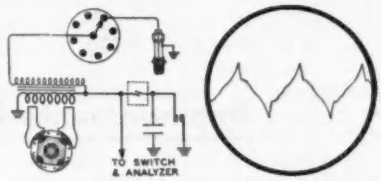
Six Typical Oscilloscope Patterns for Various Ignition System Malfunctions

BREAKER ARCING



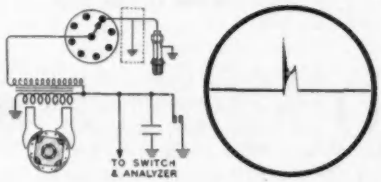
Possible cause—open primary condenser (illustrated within dashed line), severely burned or oily breaker points.

OPEN CIRCUIT PRIMARY



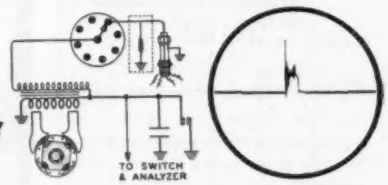
Possible cause—breaker points insulated or not closing, magneto coil to breaker lead broken or disconnected (illustrated within dashed line).

SHORTED SECONDARY



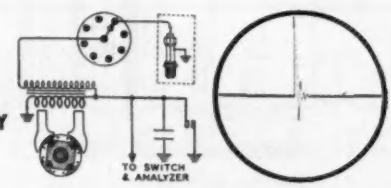
Possible cause—badly fouled spark plug, grounded high-tension lead (illustrated within dashed line), carbon track in distributor.

PARTIALLY SHORTED SECONDARY CIRCUIT



Possible cause—partially fouled spark plug, moisture or contamination at terminal of secondary lead, resistance to ground on secondary lead (illustrated within dashed line).

OPEN CIRCUIT SECONDARY



Possible cause—High tension spark plug lead not connected or missing (illustrated within dashed line), extremely wide spark plug gap, high tension cigarette spring missing or not making contact.

ble of detecting, locating and identifying abnormal engine operation caused by ignition system malfunction. Wave forms of ignition system operation can be viewed for each spark plug in a given engine. These wave forms can then be compared with known patterns so that any abnormalities in ignition operation can be identified.

Analyzer installation can be utilized in three ways—portable, portable-airborne, or airborne. A portable installation is one where the necessary wiring is installed in the aircraft, but the ignition analyzer may be used only on the ground. In-flight checks are not possible with the portable arrangement. For a portable-airborne setup, the necessary wiring and auxiliary components along with a lead storage locker are installed in the aircraft and the analyzer may be used either for ground or in-flight checks. In both of the preceding cases, one analyzer may be used for several different aircraft. An airborne installation is one in which the ignition analyzer is permanently installed in the airplane and can not be readily moved from one plane to another.

Industry spokesmen pointed out that portable-airborne installations are being used primarily for preventive maintenance, as well as engine test cell, prior to release for flight and post-flight, and general inspection. Airborne equipment is utilized in the pre-flight, climb, during flight and post-flight stages. Most of the airline representatives seemed to prefer either of the installations just mentioned rather than a portable unit.

A USAF spokesman told the group of a test made by the military where the ignition analyzer was used on 23 aircraft over a 60-day test period. In the same interval, 22 other aircraft were checked without using an analyzer. The USAF, after keeping complete records on the 45 planes for the 60-day period, determined that only 117 spark plugs were changed on the 23 aircraft using an airborne analyzer, while on the 22 non-analyzer checked craft over 700 spark plugs were changed. Another participant at the conference stated that his airline has experienced 28 per cent less delays and has used 17 per cent fewer spark plugs since using ignition analyzer equipment.

When the instrument is used for vibration analyzation, with proper vibration pick-ups to various engine locations it was pointed out that it is very satisfactory for detonation indication when used in the laboratory. The unit was said to be applicable also for engine overhaul work, but that incipient engine failures are rather difficult to detect.

Many members of the conference also mentioned the use of the ignition analyzer in their ignition overhaul shops for testing magnetos and spark plugs.

The analyzer can be used on either magneto or battery ignition systems, therefore it is readily adaptable for use on automobile marine, and industrial engines. This field is currently being surveyed by the various manufacturers of ignition analyzation equipment.

Not only was the analyzer discussed at the conference, but technical papers were presented on improvements in jet engine ignition systems and the reciprocating engine surface gap ignition system. Abstracts of both of these papers are presented herewith.

Improvements in Jet Engine Ignition Systems

By S. E. Gregoire

Assistant Chief Engineer

Scintilla Magneto Division
Bendix Aviation Corp.

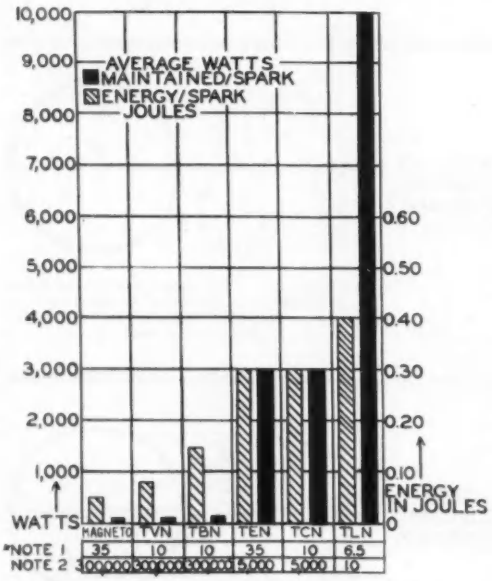
ONE of the first ignition developments for jet engines, along conventional lines, was a vibrator and transformer combination. This unit was somewhat similar to the inductive type boosters used for starting purposes on reciprocating engines, but it was brought to a higher stage of development on performance characteristics. This system proved itself by the fact that, although it was one of our earlier developments, it is at this date a production item of sizeable quantity and identified as Type TVN.

There were, of course, some engines that were more difficult to start than others. For this type of requirement research was started on an entirely new circuit which, it was hoped, would result in more effective ignition than anything heretofore tried.

The operating characteristics of the jet engine were studied and it was realized that the conditions under which "light-off" must be accomplished were anything but optimum. For example the fuel-air mixture flows by the igniter plug at a velocity of 300 ft plus per second and the spark must ignite the mixture in a matter of seconds. Delayed light-off of the mixture causes the unburned fuel to accumulate in the engine and when ignited, increases the temperature beyond the normal safe operating limits. This results in a "hot start" which is detrimental to the turbine wheel.

We realized that the time exposure and heat content of the spark are very important factors for two reasons. First, to attain a kindling temperature of a small portion of the mixture as it flows by the igniter in the least possible time, and second, to sustain it until the flame propagates to render the combustion chamber self-supporting. We knew that by increasing the voltage output of an inductive type circuit, say from 15 to 25 kv, but retaining the same energy and discharge time, appreciably very little could be gained in "light-off" ability of the spark, since voltage is not a measure of spark temperature. An increase in voltage will not produce a hotter spark if the energy and discharge time remain the same. Higher voltages, however, do cause more insulating problems.

What we wanted the new system to produce was a hotter spark. Therefore, the logical approach was to develop a circuit, whereby enerby could be stored and discharged in the matter of microseconds. The results of this investigation concluded in the development of the TEN type system. This non-conventional design has a capacitance-electronic circuit, employing a condenser for storing the energy and electronic tubes and rectifiers for controlling the circuit. The output was



* NOTE 1—Average weight in lb for dual ignition.
NOTE 2—Minimum ohmic shunt leakage resistance of igniter plugs.

This chart summarizes the development of jet engine ignition systems.

increased to 3000 watts as compared to approximately 100 watts we were accustomed to working with for inductive type circuits.

This circuit was developed to supply two sparks almost simultaneously to the igniter plug. Both are the product of condenser discharges. The first spark is of high frequency and high voltage, but of low energy and low temperature. Its purpose is to provide a conductive path, by ionization, between the igniter plug electrode gap in order that the second spark can follow. The high frequency character of five microseconds duration, combined with the high voltage of about 15 kv, insures this ionization even though the igniter plug may be badly carbon fouled.

The second spark is of low voltage but of high energy and high temperature. It is this spark that actually produces the high wattage which ignites the fuel-air mixture. Because of its low voltage characteristics, it is dependent on the ionization action of the first spark to provide a conductive path to discharge across the igniter plug gap. The total duration of both sparks is about 100 microseconds and the average power level is 3000 watts.

Research continued for a lighter version and this work crystallized in the TCN type system. This system produces the same spark characteristics of the TEN type and also employes a capacitance type circuit. Improvements in circuitry and design in general resulted in a weight saving of 25 lb over the TEN type. Because of its compactness, the TCN system is installed completely on the engine instead of divided between the airframe and engine as was the previous necessity.

Next in development, there was a program which pointed toward eliminating the high voltage ionizing discharge. This required considerable research in igniter plug development which finalized in a shunted surface gap electrode configuration. In general, the plug is similar to conventional igniter plugs in size and weight. However, built into the nose is a substance which instantly ionizes the gap between the center electrode and the shell whenever a potential of a few hundred volts appears across the electrodes.

Therefore, it is possible to operate this system at 1000-v output as compared to 15 to 20 kv required for the TEN and TCN type systems. By improvements in the electrical circuit and mechanical design, it was possible to increase the average power level to 10,000 watts and reduce the overall weight of the system to 6.5 lb. It is apparent that the lower operating voltage of the system results in a higher reliability factor. The problems of insulation, dielectric losses, capacitance loading, corona, flash-over, moisture and many others are practically eliminated.

Another improvement was effectuated in performance by the fact that this system, identified as TLN Type, could fire a shunt resistance of 10 ohms across the igniter plug. This compares with 5000 ohms for the TEN-TCN Types and 300,000 ohms plus for conventional ignition. This meant a remarkable improvement on igniting under fuel-wetted and badly carbon-fouled igniter plug conditions in adition to light-off ability.

Analyzation of the Creepage-Gap Ignition System

By Tullio Tognola

Scintilla Magneto Div.
Bendix Aviation Corp.

DURING the last few years a considerable amount of work has been done in connection with a new ignition system which became known as the creepage gap ignition system. Today this system is apparently still in the development stage. Progress towards its completion is being made but it seems that additional work will be required to arrive at a practical solution. The purpose of this discussion is to evaluate the merits of this system and also point out some of its shortcomings. Electrical constants of four electrical systems — high tension, low tension, high frequency and low tension creepage — are shown in the accompanying table. The basic circuit of a

(*Turn to page* 84, *please*)

Electrical Constants of Bendix Scintilla Various Ignition Systems

Magneto	Volts Peak	Distributor and Plug Voltage	Parallel Resistance Ohms	SPARK Frequency Cycles	SPARK Energy Joules	SPARK Duration Micro Seconds	Watts
High Tension	16 kv	6-12 kv	300,000	1,000	0.03	1500	20
Low Tension	300 v	300 v/6-12 kv	100,000	4,000	0.02	500	40
High Frequency	370 v	370 v/6-12 kv	10,000	75,000	0.001	12	80
Low Tension Creepage	2500 v	2500 v	10	250,000	0.005	2	2500

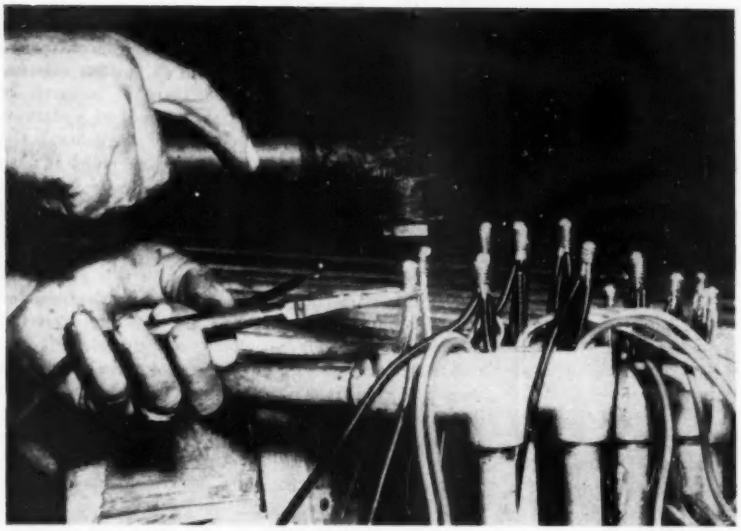


Figure 1

Welding aluminum wire on a construction job. Note the electrode and grounded pliers in position for welding.

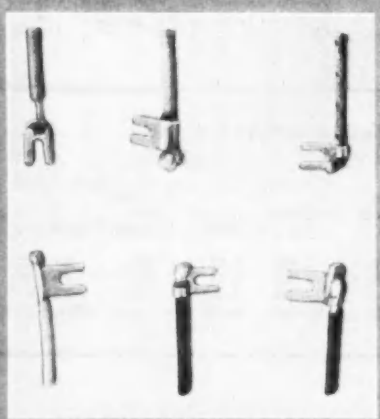
By P. B. Dickerson and C. R. Dixon

Alcoa Process Development Laboratories

New Welding Process Developed for Joining Small Aluminum Wires

Figure 2

Various joint designs showing aluminum wire joined to aluminum terminals.



A WELDING process which results in rapid joining of small diameter aluminum wire up to about No. 8 has recently been developed by the Aluminum Co. of America. This method would supplement and might in some cases be better or more economical than the presently accepted methods of joining.

Alcoa's Process Development Laboratories have successfully arc welded small diameter aluminum wire but have not applied the knowledge directly to automotive and aircraft electrical connection problems. The purpose of this article is to describe the process with the hope that it might be of interest and perhaps benefit AUTOMOTIVE INDUSTRIES' electrical engineering readers at this early date. As always, it is in the field that the merits of a new process can be tested for a particular job.

In summary, arc welded joints between aluminum wires are relatively easy to make with simplified equipment and have excellent corrosion resistance. Welds also can be made between aluminum and other metals but such joints should be protected from corrosion due to galvanic action. This can be done by taping, painting or by applying joint compounds to seal the joint from the entrance of moisture.

The equipment for the new arc welding process is

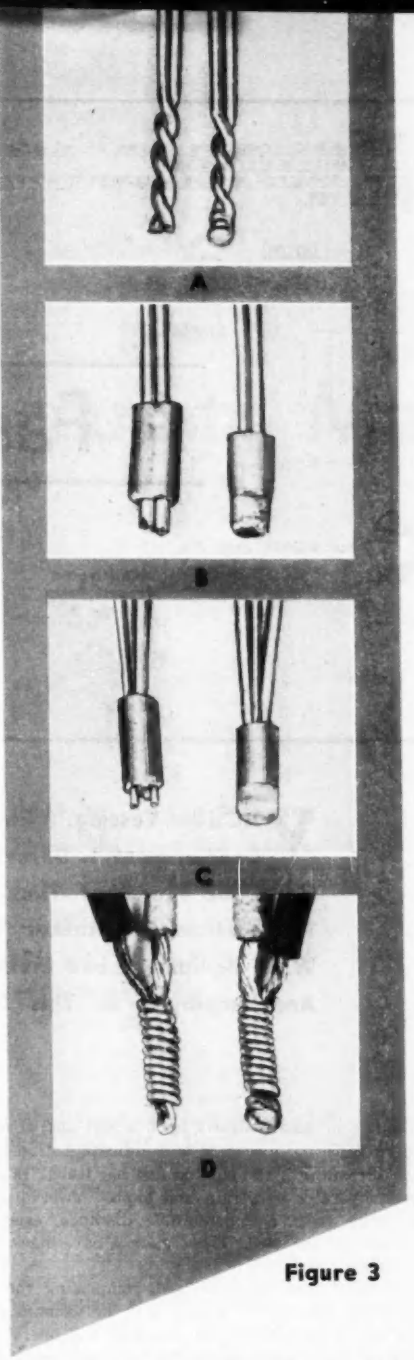


Figure 3

relatively simple. A direct current arc in which the voltage does not drop below 20 volts gives the best operating characteristics. As a source of such power, Alcoa has chosen standard six-volt lead storage batteries. These batteries possess low internal resistance and are capable of maintaining voltage under heavy load. In addition, the lead storage battery is simple, available, portable and requires no external source of power. Connected in series and tapped at different locations, the batteries provide a voltage selection in four-volt increments from 24 to 48 volts. (See Fig. 4.) Other sources of dc are acceptable if the arc voltage does not drop below 20 volts.

The use of ac as a source of power has not been fully investigated. Preliminary trials, however, indicated that sound welds can be made with ac employing a vibrating electrode.

The electrode for either ac or dc consists of a replaceable graphite button in a small holder. The ground assembly consists of a pair of pliers or other gripping device. (See Fig. 1.) Electrode and ground

Figure 3

Aluminum joint designs before and after welding: A. Pigtail joint between aluminum wires. B. Two aluminum wires with tube sleeve. C. Four aluminum wires with tube sleeve. D. Stranded copper to stranded aluminum wrapper with aluminum wire.

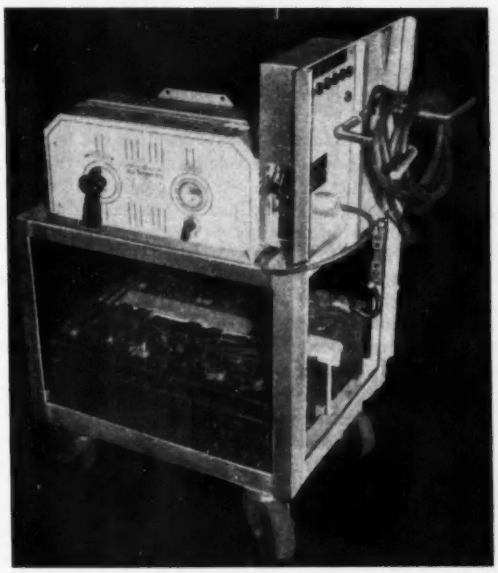
pliers are both connected with the power source through flexible leads that may be tapped into the desired voltage. A small shield may be used around the electrode to protect the operator's eyes from the arc glare.

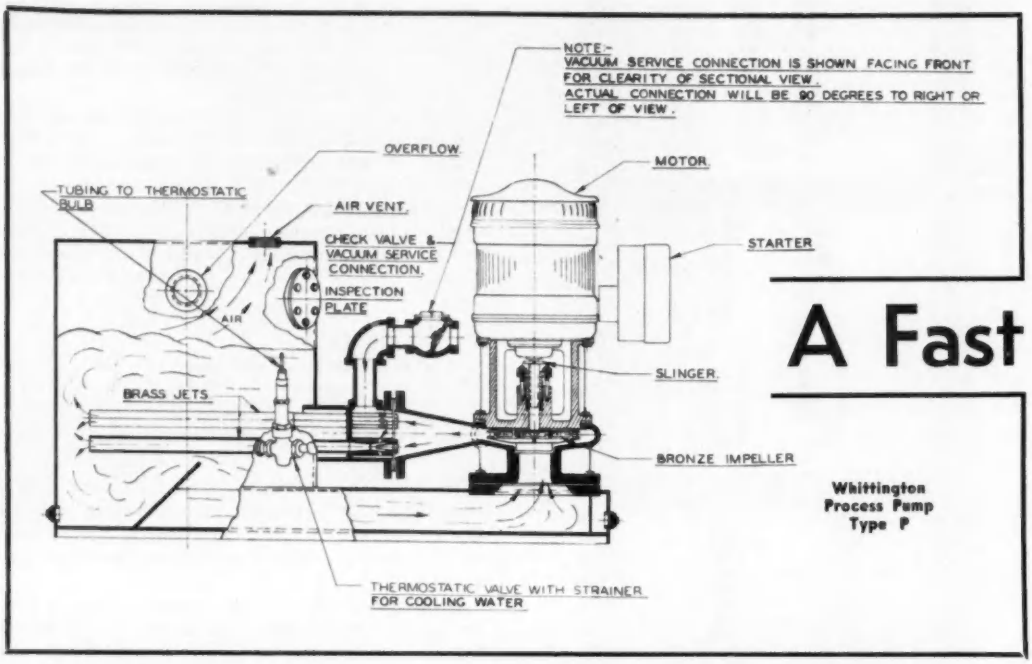
In so far as the welding procedure itself is concerned, no surface preparation is required in making the wire joints other than the removal of the insulation so that a good electrical connection can be made. The weld is made simply by striking an arc between the wire and the carbon electrode. No flux or pro-

(*Turn to page* 100, *please*)

Figure 4

This is the relatively simple equipment which Alcoa has used in arc welding small diameter aluminum wire.





A Fast

VACUUM Testing, a Recent Development, Is Described Here for the First Time. In This Article the Author Tells What Equipment and Methods Are Employed in This New

THE basic components of vacuum testing systems are quite simple. First consideration for vacuum testing is a dependable source of vacuum which can be applied to the part. Pumps capable of producing a vacuum of 28 to 29 in. are desirable as vacuum sources for testing. The vacuum source or supply must be capable of pumping sufficient volume to evacuate the space or volume of the part on test rapidly.

The second element of the basic vacuum system is the fixture. The part is applied to the fixture or located on the fixture so that its openings can be sealed and vacuum drawn on the volume or space in the part. The fixture must be arranged so the part can be readily located on the sealing pad of the fixture and the vacuum drawn up promptly so that minimum production time is used.

Also important to the vacuum system is a vacuum valve which will shut off the vacuum supply when sufficient vacuum is drawn in the part on test. This is a special valve and must close the vacuum lines without the slightest leak. It is necessary to have a completely isolated test system which includes the part on test, the lines connecting it and an indicating instrument. The importance of the vacuum valve cannot be overstressed as it is the key to the success of vacuum testing.

Indicating equipment must be connected between the vacuum valve and the part on test. It is usually a special gauge arranged so that it shows the amount of vacuum originally drawn upon a part and after the vacuum valve has closed, it will indicate a drop in the original reading if the part on test has leaks. In order to ease operator eyestrain and enable observation of the gauge from a considerable distance, especially large gauges are used. These gauges have black faces with white hands.

The test system thus devised, comprising the part on test, the fixture, the gauge, and the vacuum valve, are a closed vacuum system enabling the operator to determine very small leaks. Surprisingly small leaks in the part will cause the gauge hand to drop readily and it is easily observed by an unskilled operator. There are many modifications of the test circuit and the indicating equipment which can be made to suit the requirements of a specific part. These alterations range from transfer chambers to very elaborate indicating equipment.

The general objectives of fixture design for vacuum

By Lorance E. Sterns, Chief Engineer
Whittington Pump and Engineering Co.

Accurate Method

for Detecting Leaks

Technique, as Used in Automotive Plants to Test for Leaks in Engine Parts, Transmission Cases, Rear Axle Housings, Oil Seals, Oil Pans, Windshield Wipers, Water Pumps, Etc.

testing are the same as those found in any industry. Factors affecting fixture design are—(1) nature and size of part, (2) production rate, (3) flow of parts to and from the test area and (4) special techniques required in design of fixtures for vacuum testing because of the inherent nature of vacuum. The simplest type fixture is called a "pad type" and is a rigid plate with a hole in the center and a sealing pad cemented to it. The pad may be shaped rectangular or otherwise to suit a variety of parts which may be tested on the same pad. This fixture may or may not have guard rails around the outside to protect the sealing pad. A guard rail is required where heavy parts are slid onto the fixture and protection of the sealing pad is required. Often openings in simple parts on test can be closed by "loose" sealing pads. Careful selection of the sealing pad material is necessary for each application. Neoprene or soft rubber is used, depending upon the use factors and the difficulty of sealing.

Parts may be excessively large or difficult to handle and, as a result, it is sometimes possible to make the fixture portable. It is held in the hand and applied over areas to be tested. Many modifications of the portable test fixtures have been made to suit the particular type of job at hand. Connection is made to standard test units or indicating equipment. Special vacuum hoses are used between portable fixtures and test unit.

Moderately large parts having a large face in contact with the sealing pad may require more pressure than can be applied manually or than can be applied by the weight of the part. In these cases it is necessary to apply external force to achieve a thorough initial sealing, so that the vacuum can be drawn. After initial sealing is accomplished, most parts are held onto the sealing pads by vacuum and further pressure is not required. Often, it is impossible for an operator to apply, and hold in place, all of the pads necessary to cover the various openings of a part. Pads can be held in place by standard toggle clamps. Where there are a number of openings in a part, toggle clamps may become a bit unwieldy because of the time element required to close all of the openings. Selection of methods of sealing for test applications must be carefully studied.

Lightweight parts which cannot stand excessive pressure on sealing areas may require the use of a sure on sealing areas may require the use of a diaphragm type seal. This is a diaphragm which is operated with low air pressure and the face of the diaphragm has a sealing pad mounted upon it. These diaphragms will apply sufficient pressure for initial sealing and they are practical for sheet metal parts and large flat surfaces which would be deformed by higher pressures.

Air cylinders are used on castings and other heavy walled parts to secure firm, positive, initial sealing.

Automotive Users of Vacuum Testing

Company	Applications
International Harvester	Oil pan, water pumps
Studebaker Corp.	Water pump, cylinder head, manifolds, cylinder block
Oldsmobile Div., GM	Oil pans, cylinder head, manifolds
Detroit Transmission Div. GM	Hydramatic transmission parts
Ford Motor Co.	Manifolds, water pumps, transmission case, fuel tank, differential carrier housings, windshield wiper.
Pontiac Motor, Div. GM	Water pump, windshield wiper
Fitzsimons Mfg. Co.	Fuel tank filler pipes
Buick Motor, Div. GM	Oil pans, rear axle housing
Warner Gear, Div. Borg-Warner Corp.	Automatic transmission oil pans and main castings
Houdaille-Hershey Corp.	Oil bath air cleaner
Kaiser-Frazer Corp.	Water pump

Typical parts which are checked for leaks by the vacuum method.

Air cylinders can also be used for sealing and/or clamping parts to speed the rate of testing. Standard air cylinders are used operating from line pressures. Often it is possible to operate a clamping and sealing air cylinders simultaneously, or nearly so. It may be desirable to have the clamping air cylinders operate before sealing the openings. This is done by sequence valves in the system. The use of air cylinders facilitates use of completely automatic test cycles.

Another type of test fixture which is often used is a "pot type" fixture in which the part is totally enclosed. The purpose of this type of fixture is to test a closed cavity within a part which may be a possible leaker. The pot type fixture makes it possible to test several cavities within a part, should it be necessary. Careful design of this type of fixture is required and must be engineered to fit a specific part. "O" rings are designed into fixtures where it is practical because they seal vacuum effectively and they are easy to replace.

Many fixtures are designed to do two tests in sequence. This is particularly true in such parts as combination intake and exhaust manifolds. These manifolds have interconnecting walls inside the part which cannot be observed and, as a result, ordinary tests would not indicate leaks in the hidden walls. Vacuum applied to one of the passageways will make it possible to determine whether these areas leak.

Application of vacuum testing has necessitated the development of several types of special gauges for vacuum testing. The speed of indication is a critical factor. The greatest practical ratio of movement to slight change in vacuum is desirable.

Pilot lights are used in many models of test equipment to indicate the elements of the test operation. Another instrument important to test equipment is a timer for controlling the length of the test period. Many types of timers can be used.

Accurate Method for Detecting Leaks *(continued)*

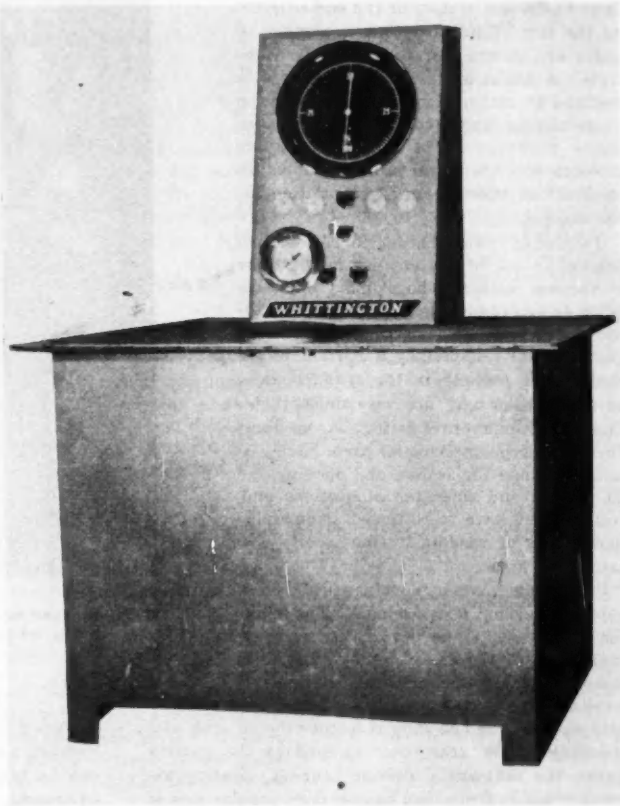
However, the most successful timer in use is a simple electronic type. They are used on automatic type jobs and on other applications where it is desirable to time the test period accurately.

Some applications of testing require accurate shutoff of the vacuum applied to a part on test. High production rate may require a fast shutoff. This is done with photo-electric cells.

In a completely automatic test machine, it is possible for the operator to place the part on the test pad and momentarily depress two push buttons and initiate the automatic test cycle which will require no further operator manipulation. The part is clamped and sealed, vacuum is applied to the cavity and shut off when the vacuum has reached the proper level; then the test period is timed and the condition of the part is indicated by green or red light whether it is good or bad. After the test period has ended, the part is released automatically so that the operator removes the part and moves the next part up for test. These circuit components are arranged to suit numerous applications.

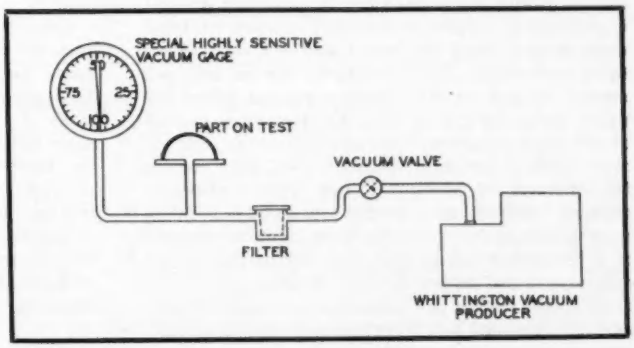
Further developments of these control combinations make it possible to conduct multiple tests simultaneously. For instance, it is possible to check all valves in an overhead valve cylinder head for leaks simultaneously, making it possible to make a fast test on this type of part. Another type of production test which is very interesting is the sequence test. A part may have two or more cavities and it may be necessary to make each test separately with one cavity adjacent to the one on test open to atmosphere.

A number of test units may be incorporated on a turntable in such a manner that extremely high production rates can be realized. The part is loaded at one station and then the turntable indexes so that the next station comes up to the loading station. The removal of the parts is



Universal test machine for small parts. This Whittington TE-½ unit is operated with a plug-in foot switch (not shown).

Basic vacuum testing system.

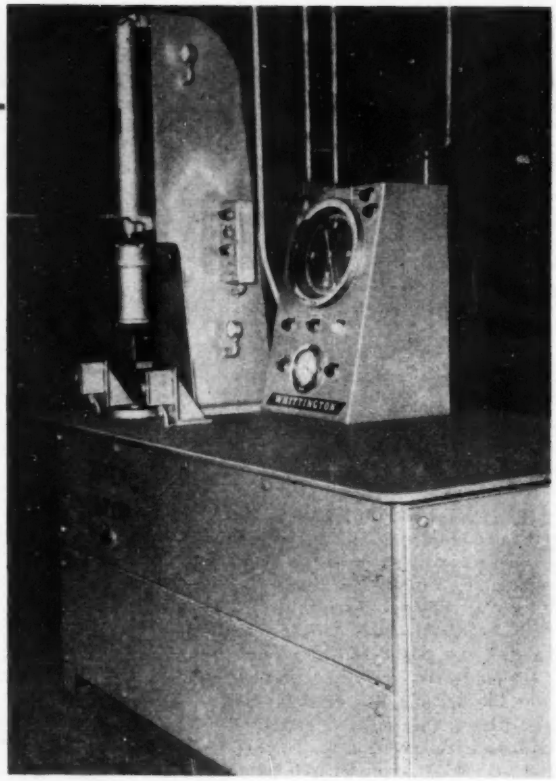


done at the last station or the one adjacent to the last station, so that a number of parts are on the test period at the same time. A sufficient test time per piece is realized to attain a good test in addition to developing tremendous production rates. Many modifications of the turntable are possible and they are readily adapted to applications where there is justification for the equipment.

Testing of cylinder heads for automotive engines is one of the popular applications of vacuum testing. The primary objective being to determine whether water passageways leak. Cylinder block testing also is quite popular. Especially important is the checking of porosity in the cylinder walls as water leaks here are very undesirable. Engine oil pans are tested by vacuum. These are large sheet metal parts having a suitable flange for sealing and openings in the bottom and sides for connections and drains which have to be tested. Numerous applications of vacuum testing to oil pans have been made.

Differential carrier housings are being tested on vacuum test machines. The main difficulty seems to be porosity where the thicknesses of the cross sections vary and cause defects in the castings. Rear axle housings are tested by vacuum. These tests on rear axle housings also cover the oil seals and gasketing of the rear cover as well as the gaskets around the differential carrier housing. Testing assembled water pumps has proven very popular and is being used in a number of plants to determine the tightness of the mechanical seal in the pump. It is hardly necessary to add that the test also covers the general assembly and the casting itself.

Windshield wipers are tested with vacuum producers without much instrumentation, since all that is required is a primary source of vacuum. A small sized vacuum pump has been found well adapted for these applications. Valve testing in engines has been applied by two methods. In one method where the valves are in the engine head, it is possible to test all of the valve chambers simultaneously using four or more stations operating simultaneously. This enables the operator to check the individual combustion chamber valve tightness readily and quickly, yet it is quite adaptable to production lines. Another method of valve testing may be used when the surface of the area around the valve is smooth. A hand-applied cup, more or less similar to a suction cup, is fitted directly over the valve and held there manually until a vacuum



Automatic test machine for ordnance part. This machine makes two tests in sequence; total time per piece is only 23-25 sec.

is drawn and the test is made. Oil seals are tested by vacuum, since they are small and easily handled, they can be tested at high production rates with simple equipment. Mechanical, or packless, pump seals can be tested by vacuum. Diaphragm type seals are not only tested for leaks, but also for flatness of the seal against a master surface. It is possible to test these seals for tightness at the friction joint without disturbing the diaphragm. This type of testing is quite unique.

Cast iron transmission cases are being tested by vacuum including the automatic type transmission cases. Leaks in these cases are undesirable and, since there is considerable change in the cross section of the walls of the castings, porosity is a problem. Since there can be no leaks whatsoever, it is customary to test these castings in the production line. It is also possible, by means of a flow test, to check the oil passageways for restrictions where such tests are justifiable. Gasoline tanks also are being tested by vacuum and this operation has proven quite practical. However, the vacuum is applied to the tank at a reduced amount in order to avoid the possibility of col-

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News of the MACHINERY INDUSTRIES

By Thomas Mac New

Higher Rake Angles for Milling Cutters Advocated. New Mechanical Handling Method Incorporates Measuring Devices.

Higher Rake Angles

Although much research has been carried out on the effect of cutter angles on tool life and general performance on carbide tipped milling cutters, very litle data has been available, until recently, concerning the influence of rake angles on tool life for milling with HSS cutters.

In a study of high speed steel cutters, made by Joe H. Crawford and M. Eugene Merchant, Cincinnati Milling Machine Co., it was disclosed that superior performance—improved tool life and surface finish—can be obtained with higher rakes and cutting speeds. This conclusion was based on the following basic factors:

1. Higher shear angle and correspondingly shorter path of shear.
2. Lessened cutting forces.
3. Lower value of chip-tool interface temperature.
4. Greater metal removing efficiency and a correspondingly lower value for work done in cutting.
5. Less built-up edge, in turn causing less wear due to abrasion and chipping.

They found that, at higher cutting speeds, a maximum tool life is obtained in face milling with rake angles of 30 to 40 deg. According to the researchers, this is because with very low rake angles, shear angle is low, tooth forces are high, a built-up edge is present and tool-chip interface temperatures are high, though falling with increasing rake angle. However, with extremely high rake angles, the tooth form is fragile, tooth forces are no longer decreasing appreciably with increasing rake, friction coefficient is high and rising rapidly, and tool-chip interface temperatures are high and rising rapidly with increasing rake angle.

Technological Council Set Up

Formation of The Council for Technological Advancement, "to program, pioneer and promote ideas for a more dynamic American economy," has been announced by William J. Kelly, president of the Machinery and Allied Products Institute with which the new Council is affiliated.

The program of the Council will be under the guidance of a Board of Trustes of 38 industrial executives of companies particularly identified with technological advancement. Mr. Kelly is chairman of the new group.

General outlines of the Council have been extensively discussed at MAPI meetings during the last six months, according to Mr. Kelly. Decision as to specific projects to be undertaken will be made by the new board of trustees, but it has been agreed that the major fields in which the Council will be active are:

1. Marketing af industrial equipment, both domestic and export.
2. Exchange and promotion of engineering ideas on plant modernization, alternative production methods, plant construction and location, and the like.
3. Equipment leasing and financing to facilitate acquistion of new facilities.
4. Advancement of thinking on and understanding of measures which may be taken by industry to alleviate the cycles of demand for capital goods.
5. Inter-industry and university collaboration on economic and industrial research.
6. The relation of patents to technological advancement.
7. Economic measurement of the effects of the changing value of the dollar on industry's equipment depreciation and replacement policies.
8. More extensive education of industry on capital goods economics.
9. An information program for industry and the public on technological trends and new techniques, products and industries.

$30 Million Backlog

Net earnings of The Monarch Machine Tool Co. for the second quarter, after taxes and other charges, were $302,374 on net shipments of $5,942,770 or 72 cents per share, it was reported by Jerome A. Raterman, president.

Net earnings for the first quarter were $270,312 on net shipments of $5,160,078, equivalent to 64 cents per share. Net earnings for the first six months of 1951 totalled 84 cents per share.

Commenting on cancellations of machine tool orders as the plans of de-

(*Turn to page 126, please*)

Machine Tool Shipments by Class of Products

As reported by the Industry Division, Bureau of the Census

Type of Machine Tool	1951 Number	1951 Value	1950 Number	1950 Value	1949 Number	1949 Value	1948 Number	1948 Value
Boring Machines	2,518	$ 75,068,000	1,363	$ 29,402,000	1,212	$ 29,430,000	1,268	$ 24,098,000
Broaching Machines	681	11,975,000	374	4,883,000	290	3,411,000	343	3,779,000
Drilling Machines	19,257	70,916,000	9,917	33,129,000	6,305	25,271,000	10,125	32,816,000
Gear-cutting and Finishing	2,452	38,336,000	1,402	19,819,000	1,095	14,231,000	1,367	16,407,000
Grinding and Polishing	109,782	121,115,000	79,274	60,859,000	64,257	45,660,000	98,792	47,294,000
Lathes	43,107	170,529,000	30,251	89,716,000	18,631	62,289,000	29,322	81,106,000
Milling Machines	11,287	70,257,000	6,975	36,452,000	4,397	31,400,000	6,064	34,914,000
Planers	111	5,966,000	84	3,035,000	99	3,699,000	157	4,828,000
Shapers (except gear)	1,096	6,095,000	794	3,397,000	666	2,831,000	1,369	5,826,000
All Other Machine Tools	.....	59,465,000	.....	35,051,000	.....	23,148,000	.....	26,453,000
Total	.....	$629,722,000	.....	$315,743,000	.....	$241,370,000	.....	$277,521,000

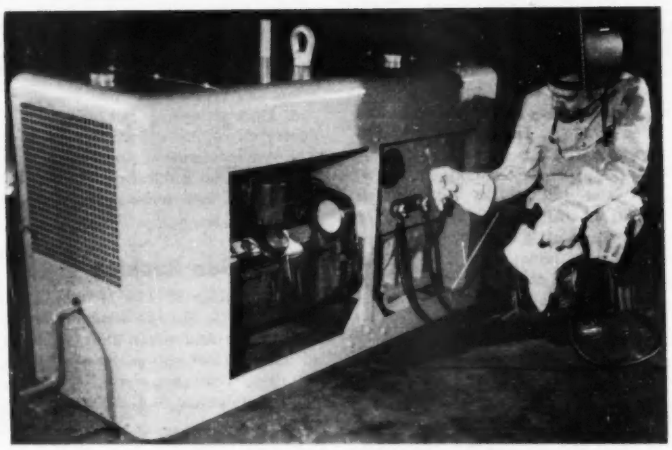
NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Light-Weight Engine-Driven Welder

A light-weight, compact engine-driven welder (Type EW-20) is now available. Equipped with complete engine accessories and auxiliary apparatus, the welder also can supply 110-v, 60-cycle, single-phase power from a conventional plug-in outlet.

Nominal rating of the welder is 200 amp, 40 v, 60 per cent duty cycle with current range from 40 to 250 amp in accordance with NEMA standards. During off-welding periods, auxiliary power of three kw at 100 per cent power factor or two kva at 80 per cent power factor are available for lights and power tools. During welding periods about 300 watts auxiliary power is available for lights.



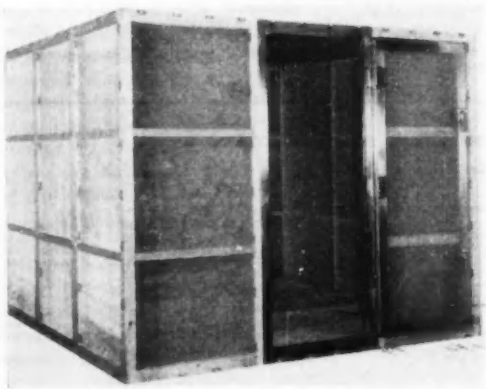
Westinghouse engine driven welder, type EW-20.

Coupled to a Ford "120," four-cycle, four-cylinder, water-cooled industrial power unit, the self-excited, compound-wound generator functions both as a d-c generator and a single-phase alternator for auxiliary power. Welding current is controlled in four ranges by a tap switch and shunt field rheostat. The a-c power circuit includes conventional outlets, a voltmeter, and a breaker with overload protection.

For portability, two-wheel running gear suitable for high-speed road towing is available. *Westinghouse Electric Corp.*

Circle E-1 on page 65 for more data

Portable Cell-Type Shielded Enclosures

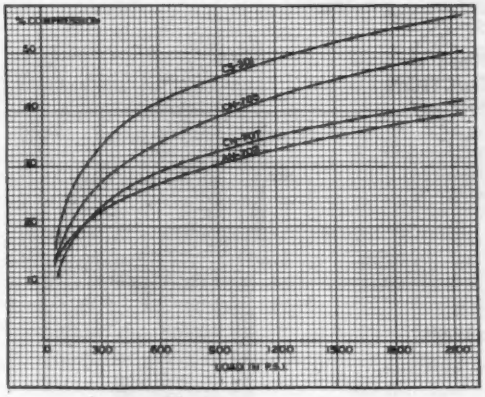


Ace portable cell type shielded room.

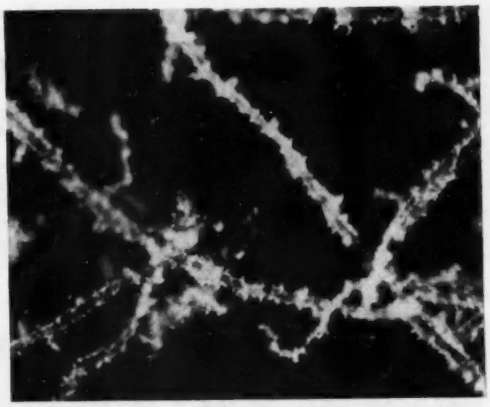
Now in quanity production are portable cell type shielded enclosures for testing and assembling sensitive electronic equipment. These screen rooms are said to produce a minimum attenuation of 100 db from 0.15 to 400 mc and to closely approach that attenuation at 10,000 mc.

Line filters may be installed in about five to 10 min per filter and can be replaced with other types whenever required, according to the manufacturer. When removing the filter the waveguide attenuator does not effect the attenuation of the room. Six waveguides are provided for each room. The enclosures can be readily made in any length or width. *Ace Engineering.*

Circle E-2 on page 65 for more data



Accopac's high compressibility is shown by these load compression curves. Four materials are depicted by the graph.



This microphotograph (100X) of Accopac shows how uniformly each fiber and each cork particle is enclosed with latex.

High Compressibility Fiber Gasketing Materials

Fiber gasketing materials, trade marked Accopac, with properties said to be never before achieved in such materials have been announced. Made by a modification of the beater saturation process, these products are claimed to have high compressibility, combined with high crush resistence, imperviousness, flexibility, uniformity, and other qualities to a degree that is unique in this type of material.

The beater saturation method employed treats the fibers with water dispersions of rubber or resin. This process permits the deposition of large amounts of saturant on the fibers. With the new process, different types of fibers, saturants, and fillers may be combined to create an almost unlimited range of materials.

Features of these materials are that they will not dry out, harden, or shrink on aging or in service; they have high compressibility even under light flange pressures; they will not rupture or crush under flange pressure loads of 100,000 psi; they are homogeneous and impervious and will hold internal pressures of from 1000 to 2000 psi, depending on the grade of the gasket material and the flange pressure; they are flexible and will not crack.

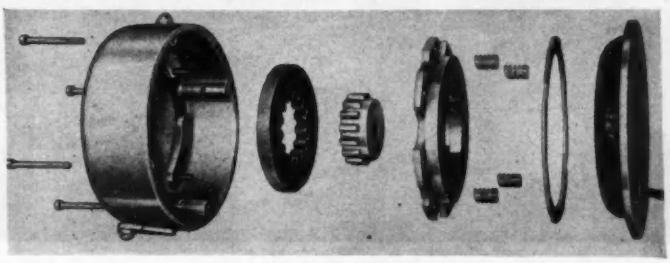
One group of these materials, made of cellulose fibers, finely ground cork, and synthetic rubber, is recommended for sealing liquids and gases at temperatures up to 250 F. The materials are available in three grades, in sheet, roll, and ribbon form and in cut gaskets and washers.

Asbestos sheets, produced by the new process, also are available. They are composed of chrysotile asbestos and Buna N type synthetic rubber binder, and are recommended for sealing liquids and gases at temperatures up to 750 F. These asbestos materials, which are available in sheet and continuous roll and ribbon form, are homogeneous and non-directional, with a compressibility of 30 to 35 per cent under a load of 2800 psi. *Armstrong Cork Co.*

Circle E-3 on page 65 for more data

Magnetic Brake for Fluid-Coupled Motors

Currently being produced is a magnetic brake design that contains six major operating parts and features a direct, automatic set and release action between the solenoid and armature. In addition to this operational feature, the solenoid is of a one-piece doughnut design that permits the motor's output shaft to extend completely through the brake.



Reuland magnetic brake.

These magnetic brakes are said to be suited to fluid coupled motors and gear reducers. The brake is installed on the output shaft of the fluid coupling with the shaft extending through the brake for hook-up to the load.

Lining wear is automatically compensated for by spring tension. Brake sets by spring action when current is cut off—releases magnetically when current is reapplied.

The magnetic brakes are available in three, 10 and 25 ft lb continuous duty ratings—15 and 35 ft lb, intermittent duty types. *Reuland Electric Co.*

Circle E-4 on page 65 for more data

(*Turn to page* 60, *please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(*Continued from page 59*)

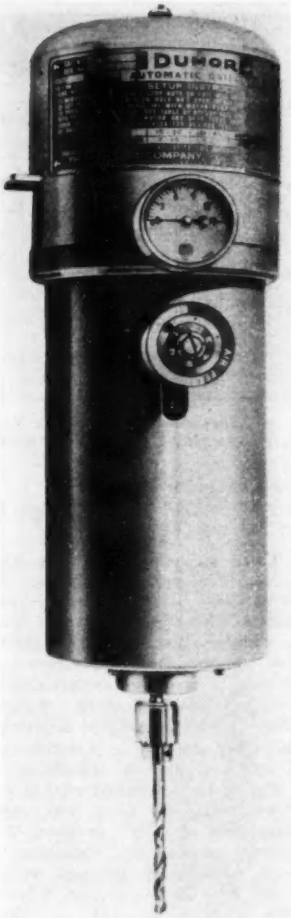
Drilling Unit Has Automatic Built-In Controls

A compact drilling unit having automatic built-in controls has been recently placed on the market. Powered by a Dumore motor, this 17½ lb unit has a Jacobs chuck mounted on one end of the armature shaft and a rotary compressor on the other. The motor performs a dual role in that it furnishes its own drilling power and generates its own air supply to advance the drill into the workpiece.

Correct pressure for each drill size with the tool's capacity is possible by adjusting pressure regulator on unit. This control of feed is said to prevent drill breakage in small-hole drilling.

The 1⅛ in. stroke can be controlled to within approximately 0.004 in. *Dumore Co.*

Circle E-5 on page 65 for more data



Dumore automatic drill head.

Tank Suspension Parts Machined on Special Unit

Six tank suspension support housings made of cast armor material having a Rockwell C-42 are finished every hour on a special machine tool recently built.

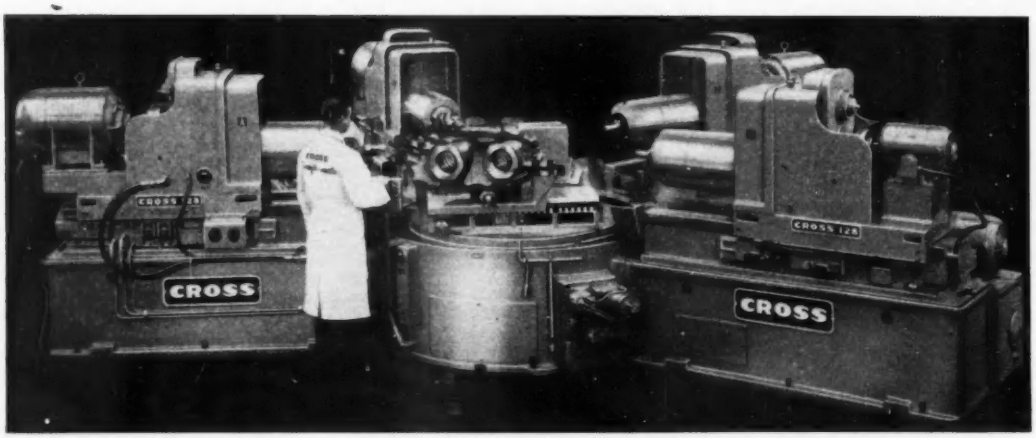
Operations include rough and semi-finish boring a multi-diameter hole and forming two snap ring grooves. After one bore of the part is completed, the fixture is indexed and the operation is repeated for a second bore.

This machine has a fluid motor operated index table with five stations. One station is for loading, three for boring and one for grooving the work.

A 40 horsepower motor is provided for each boring spindle. Hydraulic and electrical construction is to Joint Industry Conference standards.

Other features include hardened and ground ways; hydraulic feed and rapid traverse; pre-set tools; automatic, gravity operated, cam clamping for the index table; and the use of standard units to facilitate maintenance and provide flexibility for part design changes. *Cross Co.*

Circle E-6 on page 65 for more data



Cross special machine tool for tank suspension support housings.

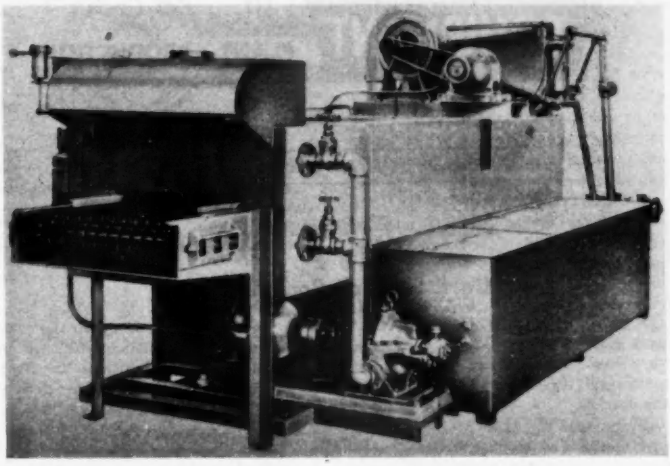
Washing Machine for Rocker Arms

A special washing machine has been designed and engineered to remove grease and chips from rocker arm shafts after the machining operations.

A unique feature of this machine is the special type of bar conveyor unit equipped with steel disks upon which the shafts ride. The disks not only hold the shafts in place as the conveyor moves through the machine but also provide minimum points of contact so the maximum surface of the shafts is exposed for fast, efficient washing and drying.

This machine utilizes the A-F Super-Spray cleaning system. The shafts pass through consecutive high-pressure, fan-shaped curtains of cleaning solution from above, below and both sides. A hot blow-off unit is used for drying.

Like all other A-F washing machines, this machine is equipped with a screen tank having two screens so that one screen at a time can be removed for cleaning without interrupting operation of the machine. As the name implies, the screen tank screens out foreign particles from the cleaning solution and thus prevents the nozzles from becoming clogged. *Alvey-Ferguson Co.*



A-F special washing machine for rocker arm shafts.

Circle E-7 on page 65 for more data

Three-Station Vertical Spindle Boring Machine

A vertical spindle cam operated three-station Bore-Matic has been developed. This Model 243 Bore-Matic is designed to provide multiple precision facing and step facing operations on clutch plates, bell housings, flywheel assemblies and other similar parts. The three-stations may be set up for simultaneous or progressive production runs and loading on any station may be done with others operating.

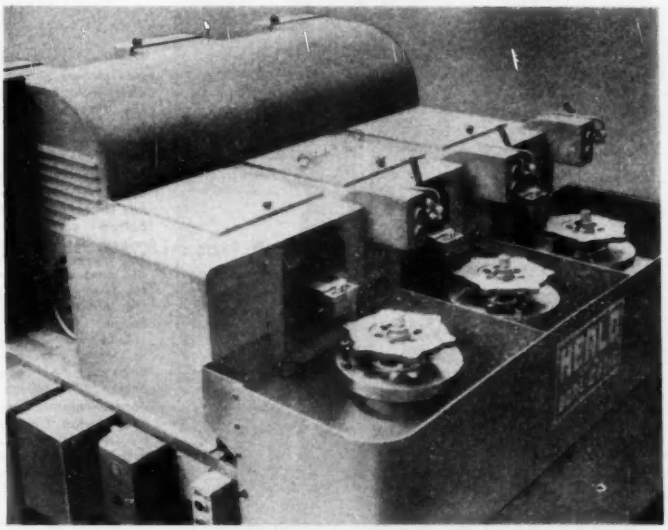
Also available for similar high production operations on a smaller scale are the Model 241 single-station and Model 242 two-station vertical spindle Bore-Matics.

Cams operating the tool slides control the cutting sped of tools as well as the stroke, thus, depending on the number of different cams provided, a wide range of machine cycling is available.

Tool adjustment is accomplished by setting index marked screws on the top of the tool blocks and may be done while other stations are operating.

The rotating air operated fixtures are mounted on vertically positioned boringheads with fixture clamp levers adjacent to each push button control station.

Chip removal is simplified by a worm or screw type conveyor which gathers chips at the base of each station depositing them in a pan at the right side of the machine. Guarding around the tool slide prevents chips from entering the cam operating section and access doors at the top facilitate periodic inspectons. *Heald Machine Co.*



Heald vertical spindle Bore-Matic, Model 243.

Circle E-8 on page 65 for more data

(*Turn to page 62, please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(*Continued from page* 61)

Cork Surface Polishing Belt

A coated abrasive polishing belt that uses granulated cork for obtaining a very high lustre on glass, ceramics, metal and plastic has been placed on the market.

Designated the 3M Wetordry, the cork surface of the belt is sized with resin combined with a polishing agent that is said to improve the polishing action. The belt is made with a waterproof, cloth backing to which the cork granules are resin-bonded. Water is recommended as a lubricant in glass grinding operations and oil or grease for use with metal. It is available in a single universal surface in all standard sizes for existing abrasive belt grinding and polishing equipment. *Minnesota Mining and Mfg. Co.*

Circle E-9 on page 65 for more data

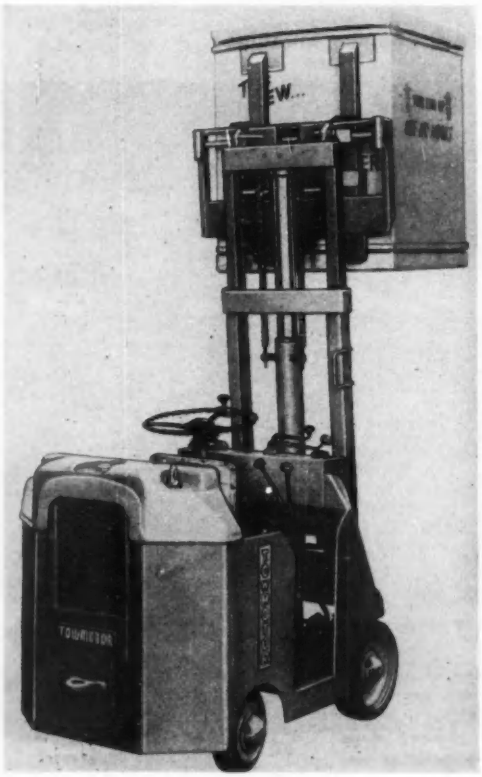
Etchant for Aluminum

Development has been announced of Composition No. 60, a material designed to produce a heavier, more uniform etch on aluminum.

Among the advantages reported by the manufacturers to be brought to aluminum-etching operations by this material are the following: (1) it etches rapidly, giving a controlled etch of any depth desired, while imparting a velvet-like appearance to the surface; (2) eliminates hard scale build-up on tanks and heating coils, leaving only a light, soft sludge which can be removed by a hose rinse; (3) provides consistent, uniform etching without excessive foaming or fuming; (4) working solutions have long life, run two, three or four weeks and longer before dumping is necessary; and (5) solutions are easy to work with, do not become clouded with suspended matter. Parts can be rinsed in cold or hot water, the manufacturers state. *Oakite Products, Inc.*

Circle E-11 on page 65 for more data

Lift Truck for Cartons



Handling heavy cartons without pallets is claimed to be one of the time-saving features of the recently engineered Carton Lift truck. Two cartons can be lifted at one time by placing the Carton Lift in contact with the bottom carton, and raising the carriage. This moves the spade-like arms of the Carton Lift up and under the interlocking cover flange.

Originally designed to move and stack heavy appliances packed in stitched, flanged containers, the new Carton Lift can be useful in many industries, according to the maker. Towmotor Corp.

Circle E-10 on page 65 for more data

Mechanically Operated Pilot Device

Flexi-Switch—a mechanically operated pilot device for controlling relays, motor starters, solenoid valves, etc.—has been announced. It is particularly adapted for operating switches, stops and feeders, automatic transfers and similar devices on conveyors.

The following characteristics are said to assure flexibility, strength and ease of repair:

1. Actuating arm can be set in any one of 72 positions in the full 360 deg. arc.

2. Two snap-action single pole double throw switch elements rated 15 amps at 120 v, ac permit four electrically separate contacts. Overlapping contact operation may be provided. Snap switch elements can be replaced without disassembling switch mechanism.

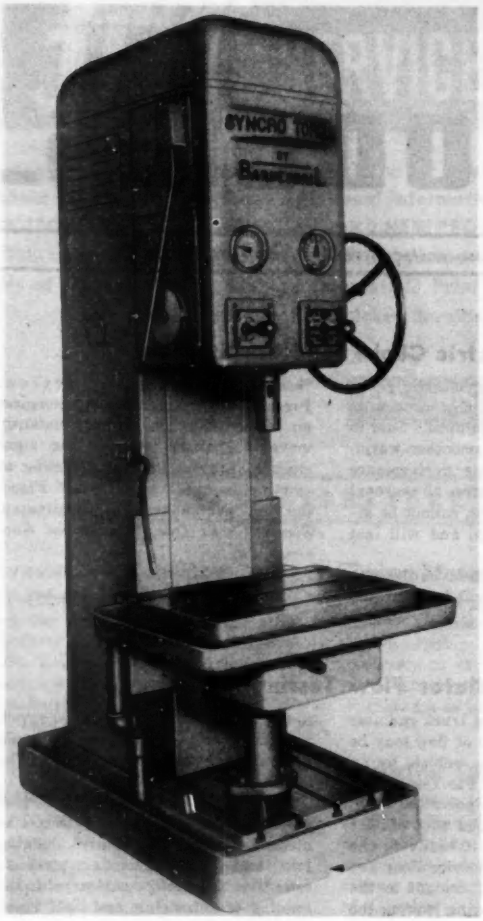
3. Arm rotation of only 10 deg in either direction operates contacts. No damage from overtravel up to 80 deg beyond actuating point.

4. Objects moved by gravity can operate switch.

5. Housing and cover are sturdy aluminum castings. Socket of actuating arm adapter plate holds any ¼ in. by ¼ in. extended arm, shaped as desired. *Jervis B. Webb Co.*

Circle E-12 on page 65 for more data

Drilling Machine Features Synchro-Torque Drive



A drilling machine designed to simplify setup and speed drilling operations is now in production. This machine features the new Synchro-Torque Drive, which is said to provide constant full-rate horsepower delivery under all conditions of speeds and feeds.

The first of a new series, the machine has 21-in. swing and 1¼-in. capacity in steel. (Barnes Drill Co.)

Circle E-13 on page 65 for more data

Gage Blocks

Gage blocks are now being manufactured from a new man-made metal which was developed to meet certain specifications. These specifications were compiled for the ultimate purpose of obtaining a metal having characteristics that make it the ideal material for gage blocks according to the maker. The metal belongs to the family of carbides, and gage blocks made from it are trademarked DC.

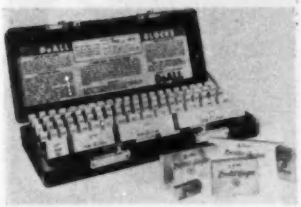
The DC blocks are said to be extremely durable so that they may be freely used under almost any working condition. Advantages provided by these new blocks are as follows:

First, these blocks have a coefficient of expansion practicaly identical with steel. They weigh half as much as tungsten-carbide blocks and about the same as steel blocks.

Secondly, the blocks have a high wearability. It will not oxidize at temperatures up to 1000 F, and it resists perspiration and other types of acid normally encountered in the shop.

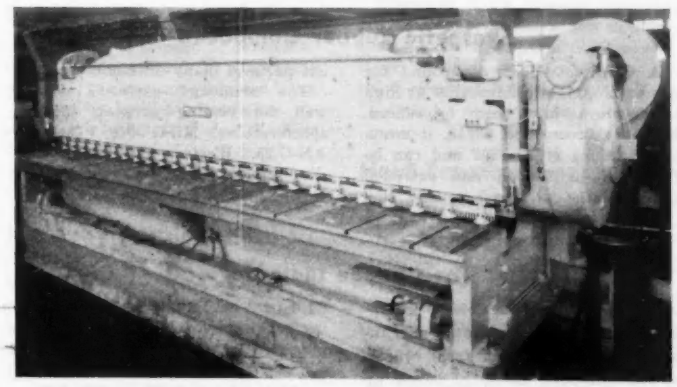
Thirdly, it is said that the blocks will not grow or shrink with age and if accidentally dropped, they do not change size or chip from internal structural changes caused by instability. *DoALL Co.*

Circle E-14 on page 65 for more data



DoALL DC gage blocks.

Squaring Shear for Aircraft Production



Cincinnati squaring shear.

An all steel squaring shear, said to be capable of cutting 24 pieces of ¼ in. mild steel plate at one time is now in manufacture. This huge shear was designed particularly for aircraft production.

The squaring shear weighs approximately 149,000 lb, and it has a cutting cycle of 20 strokes per min. The hydraulic hold-downs exert about 22 tons pressure.

Additional features of this squaring machine are 24 in. throat or gap, 48 in. back gage range, light beam shearing gage, and an air clutch control equipped with two foot valves. *Cincinnati Shaper Co.*

Circle E-15 on page 65 for more data

NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Electric Choke for Hard Starting

Now available is an electric choke designed to replace the automatic choke on any car so equipped. Said to assure instant starts, smoother warm-ups, and better engine performance in any weather, it requires no seasonal or climatic adjustments, cannot be affected by dirt or gum, and will last the life of the car.

The Electrimatic choke utilizes a combination of electrical impulse and "controlled" thermostatic action. Pressing the starter button energizes an electro-magnet which instantly moves the choke valve to the right closure required for easy starting at existing engine temperature. Flooding or overchoking is eliminated. *Sisson Choke Div., The Pierce Governor Co.*

Circle P-4 on page 65 for more data

Radiator Flow Testing Machine

Automobile and light truck radiator gallon-per-minute rate of flow may be tested in or out of the vehicle by an improved Model J-50 Flo-Tester machine which is readily portable.

The device is equipped with casters which permit moving it easily to the car or truck on the service floor for testing rate of flow of coolant in the radiator without removing it from the vehicle.

By moving the flow testing machine to the vehicle, much time can be saved, according to the maker, that would ordinarily be used for removal of the radiator.

It is also claimed that this radiator gallon-per-minute tester can be utilized to prove ordinary cleaning jobs and advantageously serves to save time ordinarily necessary for the rodding of automobile and light truck radiators. *Inland Manufacturing Co.*

Circle P-5 on page 65 for more data

Synthetic Rubber Compound

A synthetic rubber compound for use with synthetic lubricants at high temperature has been introduced. Known as compound 56243, it meets specifications Mil-R-7362 and can be furnished in molded and extruded shapes—lathe-cut, washer, and die-cut parts of many different varieties.

The compound performs equally well for sealing greases, meeting specifications Mil-G-3278, formerly AN-G-25. *Western Felt Works, Acadia Products Div.*

Circle P-6 on page 65 for more data

Toe-Change Indicator

Now available is a toe-change indicator which absorbs the parallel in-and-out motion of the front wheels as the front-end assembly moves up and down. The operater may thus adjust toe-angles under load and driving conditions while the car is on the alignment rack. *Bear Manufacturing Co.*

Circle P-7 on page 65 for more data
(*Turn to page* 118, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested. Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Investment Castings

Features of the lost-wax process and the steps it involves are fully described and illustrated in a brochure now available. Typical investment castings are discussed. *Precision Metalsmiths, Inc.*

Circle L-1 on postcard for free copy

Broaching Machine

Circular 401 provides a thorough analysis of a vertical pull-up internal broaching machine and its operation. Complete specifications, along with special features and optional equipment, are covered. *American Broach & Machine Co.*

Circle L-2 on postcard for free copy

Practical Dimensioning

Pitfalls to be avoided in dimensioning and suggestions for improving common practices are contained in an informative booklet. Numerous examples are included. *Gisholt Machine Co.*

Circle L-3 on postcard for free copy

Highway Problems

Facts about road construction, maintenance, uses, and the role of commercial traffic on the nation's highways make interesting reading in a new booklet. *Fruehauf Trailer Co.*

Circle L-4 on postcard for free copy

Timing Motors and Devices

Catalogs 322 and 323, respectively, describe electric timing motors and electric timing devices. Complete specifications are furnished. *Haydon Manufacturing Co., Inc.*

Circle L-5 on postcard for free copy

Versatile Tubing

Full installation and technical data on a widely used type of tubing is included in an illustrated brochure recently released. Numerous applications are described. *Aluminum Co. of America.*

Circle L-6 on postcard for free copy

Manufacturing Services

Discussed in an 11-page brochure are various ways in which product manufacture from the development stage through packaging can be aided. *Emhart Mfg. Co.*

Circle L-7 on postcard for free copy

Heat Treating Equipment

Carriers in a wide range of types for use in materials handling applications in metalworking plants are shown in catalog B-8. The brochure explains how fabricated alloy carriers can be made in various sizes for use in heat treating applications. *Rolock, Inc.*

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(*Please turn page*)

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L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-18	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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Fasteners

An extensive line of stove bolts, machine screw nuts, machine screws, and specialties is described in catalog 21 now available. *Progressive Manufacturing Co.*

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Fibres and Plastics

A booklet on various types of fibres and molded and laminated plastics has just been released. Properties of the materials and their applications are discussed. *Continental-Diamond Fibre Co.*

Circle L-10 on postcard for free copy

Automotive Forgings

Bulletin 5203 recently made available, describes drop and upset forged parts for cars, trucks, and tractors. *Pittsburgh Forgings Co.*

Circle L-11 on postcard for free copy

Circular Sawing Machines

Two bulletins, 375 and 475, respectively, contain specifications on the No. 3 circular sawing machine for solid rounds, squares, tubing, and structural shapes, and the No. 4 circular sawing machine for cutting metal. *Motch & Merryweather Machinery Co.*

Circle L-12 on postcard for free copy

Machinability Concepts

Vol. 38, No. 7 of "Lubrication" is devoted to the machining of metals. Extensive technical data is included. *The Texas Co.*

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USE THIS POSTCARD

Process Control

Informative technological articles on program control, time proportioning control and graphic panels are contained in a booklet which has recently been released. It includes decriptions of ways in which various companies apply instrumentation in the measurement and control of important process variables. *Industrial Div., Minneapolis-Honeywell Regulator Co.*

Circle L-14 on postcard for free copy

Air Conditioning Systems

A specification sheet describing two packaged air conditioning systems, one of 10 tons and one of 15.5 tons capacity, has recently been published. Units are available in five sizes. *Worthington Corp.*

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Cold Extrusion Process

A phosphate coating and lubricating process for the cold extrusion and forming of steel is described and illustrated in an eight-page booklet now available. The process is applicable to both carbon and stainless steels. *Detrex Corp.*

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Valve Line

A brochure (15M-7-52) describes a series of five basic valve types with three basic body designs that are available in five pipe sizes. The line may be used in nine control assemblies. *Valvair Corp.*

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Alloy Castings

Users of stainless and heat-resistant alloys in cast form will be interested in a 48-page booklet now available. Typical compositions and their applications are discussed. *International Nickel Co., Inc.*

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Pickling Acid Inhibitor

A chart of the principal types and characteristics of a popular inhibitor compound is now available. *American Chemical Paint Co.*

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Metal Polishing

Vol. 43, No. 6 of "Grits and Grinds" contains an interesting article on metal polishing with the compress canvas contact wheel. The development and application of the method are discussed. *Norton Co.*

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Toggle Clamps

Now available is a 12-page catalog on a complete line of toggle clamps for all types of work-holding and fixturing operations. *Danly Machine Specialties, Inc.*

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(*See preceding page*)

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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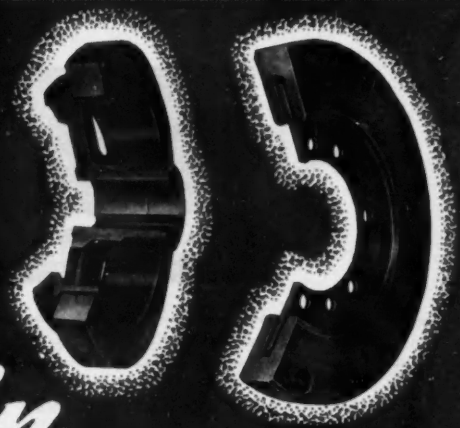

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VIBRATION DAMPERS

A never ending stream of dampers, hundreds of thousands of them, to improve the performance of the country's fine engines is one of our production tasks for the automotive industry. We manufacture dampers in a wide variety and for all engine sizes and have been at it so long that we have been recognized as headquarters for damper design and as the chief supplier to the industry of this all-important item. Many top ranking engines carry Schwitzer-Cummins dampers and have been benefited materially thereby. They have given excellent service.

Our long years of service to the industry on internal combustion engines of all types, large and small—oil and gasoline, have developed a rich fund of experience with dampers and a knowledge of what to do and how to do it in designing and building. You will find this experience invaluable in any damper problems you may have and you will find it on tap for you if you think we can assist you in your damper design or as a supplier.

Our production facilities cannot be excelled and are constantly being increased. We can serve you well as a damper source and would like to do so. You want either improved, smoother performance for your engine, or a superior damper at a saving. We can give you both and take good care of your production needs. May we hear from you?

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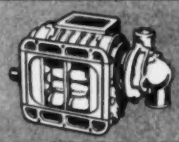
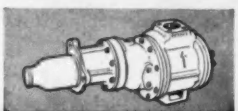


SUPERCHARGERS

AUTOMATIC SHAFT SEALS

HIGH PRESSURE OIL PUMPS



AIR MOTORS | **WATER PUMPS**

SCHWITZER-CUMMINS COMPANY
1125 MASSACHUSETTS AVENUE
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NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Check Valves

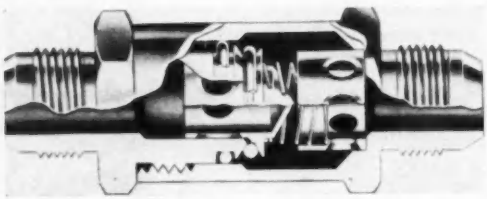
Designated the 299A-4TT, a valve designed specifically for high pressure air or nitrogen requirements from naught to 3000 psi is available to the trade.

The 299A-4TT utilizes the "Circle Seal" principle which is said to provide tight sealing at high pressures and at very low pressure differentials. The "O" rings furnished are AV 6290 compound molded to AN 6227 size.

Manufactured of aluminum, the check valve weighs approximately one ounce. Hex size is ¾ in. Length conforms to AN 6249-4. *James-Pond-Clark.*

CHARACTERISTICS	
Operating pressure	0-3000 psi
Proof pressure	6000 psi
Burst pressure	over 7500 psi
Operating temperature	—45 to 165 F.
Flow check leakage, 0-3000 psi	none
Mounting limitations	none

Circle P-1 on page 65 for more data



James - Pond - Clark check valve, Model 299-A-4TT.

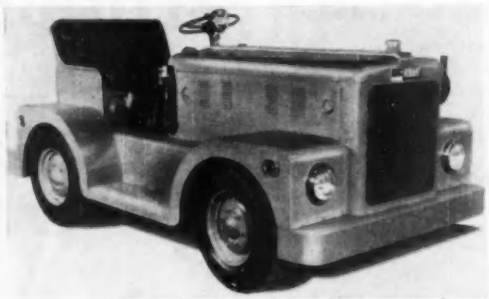
Ground Power Unit

A self-propelled ground power unit, Model 871, powered by the Chrysler V-8 engine, is now available. This power unit answers a dual purpose—functioning as a standard self-propelled vehicle for getting to the airplane, then as an auxiliary ground power unit to take over the plane's electrical load.

The Model 871 is specifically designed for aircraft where up to 1000 amp loads are necessary. It is a heavy-duty power unit, providing constant voltage, 28.5-v, dc, for checking out aircraft and starting engines.

With its overload capacity, it is said to be capable of starting the engines of the largest jet or piston engine planes. *Motor Generator Corp.*

Circle P-2 on page 65 for more data



Motor Generator self-propelled power unit, Model 871.

Motor Operated Valve

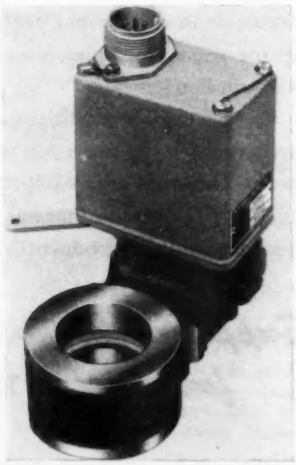
A motor operated gate valve is being introduced, which according to the manufacturer, is one of the lightest and most compact ever developed. An entirely new method of manual override is said to be an important feature of this valve.

Teflon is used for sealing, and all seals are spring loaded and confined, where necessary.

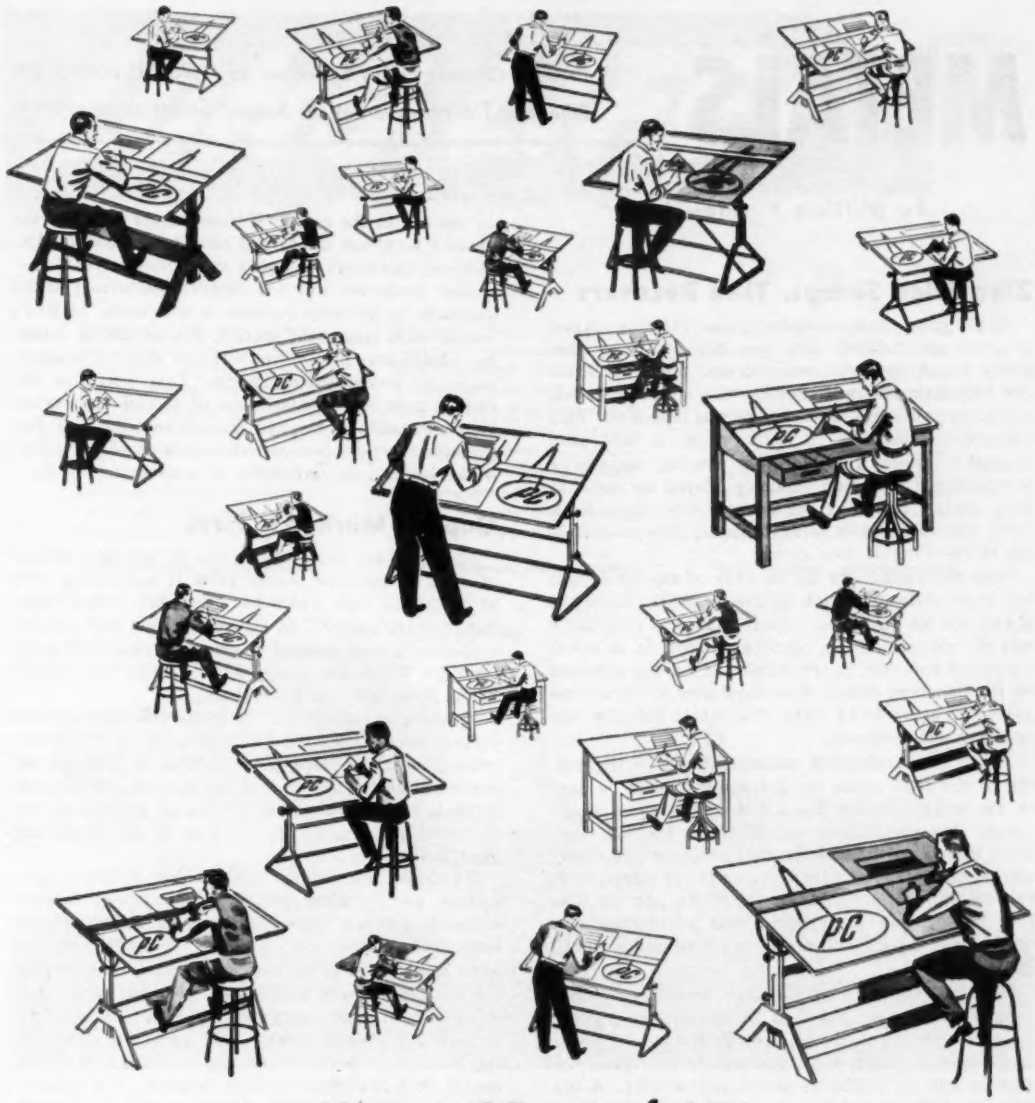
One of the unusual innovations claimed for this valve is its limit switching arrangement which makes it impossible for the valve to stop in mid-position. This design also is said to make possible a manual override which completely bypasses the motor and gear train, and requires operating torque similar to that of a manually operated valve.

The valve has an operating time of one sec maximum and operates at a voltage of 18 to 30 d-c. Its proof pressure is 200 psig. It works at —65 F to 165 F and at a pressure of zero to 65 psig. *Hydro-Aire, Inc.*

Circle P-3 on page 65 for more data



Hydro-Aire motor operated gate valve.



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METALS

Present Copper Prices Expected to Hold for Long Time. Cheaper Tin Foreseen With Supply Situation Improved.

By William F. Boericke

Zinc Price Slumps, Then Recovers

Rapid price changes characterized the zinc market in June and August. Just one day after the steel strike began the price was cut two cents per lb; a few days later anotner reduction of 1½ cents followed, and after two weeks another cent was lopped off. That brought the price to 15 cents, where it held until August 6, when a big custom smelter, apparently overburdened with zinc, suddenly offered the metal at 13½ cents. This was the lowest price since June, 1950, and represented a 31 per cent reduction from the OPS ceiling of 19½ cents.

Both the timing and the severity of the cut caught the trade unawares. Zinc futures promptly broke 100 points for all positions. Other producers reluctantly met the cut; in Canada, big Consolidated M. & S. Co. quoted 13 cents per lb, which allowed for the premium on the Canadian dollar. Five days later the price was jacked up again to 14 cents. The whole industry was unhappy and confused.

It had been confidently assumed that with the ending of the steel strike the galvanizers would be back in the market in full force and a firm price would result. Disappointment ensued when the big steel firms merely took deliveries against orders originally placed with producers for June shipment which were subsequently deferred during the strike. At the time this was written it appeared that substantial new orders from the galvanizers would not be shipped until September.

The July statistics of the Zinc Institute revealed an increase in zinc stocks of 33,888 tons during the month and brought the total to 96,919 tons, highest figure since October, 1949, and nearly five times the tonnage held by producers at the end of 1951. A big increase in stocks had been anticipated and caused no surprise to the trade. A further increase is expected when the August figures are released. Shipments of slab in July were some 4000 tons less than in June. Average for the two months was about 45,000 tons, which compares with a monthly average of 76,500 tons in 1951. Meantime production remains high.

While the tariff of 0.7 cents on zinc went into effect automatically late in July, it had no effect in staying zinc imports or preventing the price decline. More talk is heard of a civilian stockpile for zinc, to take up surplus metal, just as was done for lead. As this expedient did not win wholehearted approval from the lead industry, it's doubtful if zinc producers would greet it more favorably. But zinc miners will be hard hit by the drop in ore prices which follows on the heels of the cut in the metal. Without doubt many of the smaller high cost mines will have to suspend production and this won't look good in an election year.

Zinc producers will find their competitive position improved by the price increase in aluminum. In zinc's second most important market, the diecasting industry, aluminum's price advantage over zinc is cut appreciably by recent price changes. Last year the diecasters took over 266,000 tons of special high grade zinc but aluminum has been cutting into the field. For example, Chrysler is reported to have developed a new diecast aluminum carburetor to replace zinc types.

Copper Market Is Firm

Standing out unscathed in the deflationary trends of other metals, the copper price is undeniably firm at 24½ cents a lb, which has been aptly named "bargain counter copper." In view of the fact that foreign copper is in good demand at prices varying from 33½ cents for Rhodesian copper to 35½ cents for Chilean metal, this term is not ill-chosen.

Washington apparently is convinced that present copper prices will hold for some years. Numerous price guarantees have been granted to new copper mining projects. The most recent has been to Calumet & Hecla Co., guaranteeing a price of 25½ cents per lb for 53,000 tons to be delivered by mid-1962, ten years hence.

No doubt the avidity with which domestic consumers are reaching even for high priced foreign copper is partially scare-buying. Some consumers believe that a copper strike, with a tie-up in domestic mine and smelter production, may occur. Undoubtedly there is considerable nervousness over the labor situation and in most instances the men are working without a contract, which would permit a strike at any time. A strike is not inevitable, unless the union insists on a 25¢ wage increase demand. If a reasonable increase is accepted, it's likely it would meet approval of the Wage Stabilization Board and OPS would probably grant an increase of perhaps two cents per lb in the domestic ceiling price, along the same general line as was done for aluminum.

In this event the heat would be off the foreign price and a decline to more reasonable levels could ensue. It is worthy of note that the Chairman of Belgium's important Katanga mine in Africa, one of the world's major copper mines, recently declared to stockholders that present foreign prices were too high, and even 27½ cents per lb was unwarrantable upon which to calculate future profits.

The latest copper statistics revealed a decrease in U. S. crude production thus far in 1952. Six months'

(*Continued on page* 94)

LONG LIFE!

GISHOLT

1

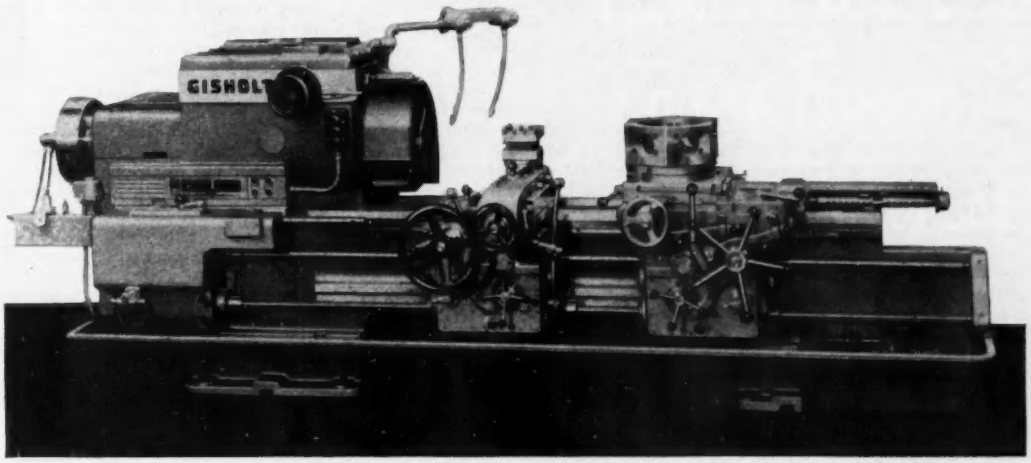
All gears in Gisholt turret lathe transmissions are high carbon alloy steel, precision ground after heat-treatment to assure long wearing quality. All shafts turn on antifriction bearings, with pressure spray lubrication. Headstock is cast integral with bed for extreme rigidity—to maintain accurate, permanent alignment.

2

Gisholt's thick, block-type ways are automatically pressure lubricated. Made of SAE 52100 tool steel, they are deep hardened to 64-66 Rockwell C and then finish-ground for exact alignment with the spindle. On top, bottom and both sides, they present a bearing surface that is virtually wear-proof—accurate for years to come.

3

Aprons are fully enclosed, all working parts protected and operating in a continuous cascade oil bath. Alloy steel gears and shafts are mounted on antifriction bearings. Positive serrated feed and traverse clutches cannot slip or drag. Safety shear pins protect feed and traverse mechanism against overload and accident.



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Observations

By Joseph Geschelin

Breaking Emulsions

One of the troublesome problems facing large users of cutting fluids is that of finding a workable and economical way to demulsify water-soluble mixtures. Paradoxically water-soluble mixtures must be very stable and free from breakdown or demulsification while they are usable. Yet the tenacious bond must be broken down completely when the material has served its purpose and must be disposed of. Your editor has little doubt that cutting fluids producers have something tangible to contribute in this connection. We know there is a problem and would be happy to pass on whatever recommendations we can get.

Nickel Supply

At the present writing nickel still is in short supply and consumers feel the pinch. We understand, however, that greatly increased tonnage should be available in a reasonably short time. One of the "ifs" in the picture has to do with Governmental stockpiling—how long to stockpile in the face of mounting production capacity. It is only natural that the enormous quantities required for military purposes, particularly for jet engines, added to the stockpile requirements can make a terrific dent in nickel production. On the other hand, unless there is something in the picture that only Government people know, it would appear good judgment to slow down stockpiling to some reasonable extent so as to relieve the consumer. According to a recent release by the International Nickel Co., Inco alone has been producing recently at the rate of 21,000,000 lb per month, while total Canadian production is over 23,000,000 lb per month. That seems like a lot of nickel.

Zinc vs Aluminum

We have commented on various occasions on the competition among useful engineering materials. At one time zinc die castings were supreme in automotive practice. But there was a constant jockeying and shifts from die castings to plastics or sheet metal with a regular reversing of these trends. More recently both aluminum and magnesium die castings have challenged the position of zinc alloys. Zinc has been hurt badly by restrictions since the start of the Korean episode. In many instances users have been forced to shift quickly to sheet metal assemblies to replace die castings. Today, even with more zinc available there is some inertia to reversing the trend in current production. In any event, it will be interesting to watch from the side lines the new competition of the light metals—aluminum and magnesium.

Die Cast Plating

While on the subject of die castings, apparently the matter of electroplating was discussed in committee at the recent ASTM convention. There was a disposition on the part of independent platers, as we get it, to write a specification calling for a little more thickness of nickel, then to eliminate use of the protective lacquer coating now specified by automotive users. The fact of the matter is that unless nickel is used in an effectively thick coating, the plating will not be durable and lacquer or something else still will be required. Personally, we doubt whether automotive people would approve the new deal.

Plastic Press Dies

One of the most dramatic innovations in mass production stamping is the use of plastic dies to replace die steels. Several years ago we described the application of casting resins for the fabrication of larger master fixtures and inspection fixtures then introduced in the automotive industries. More recently, Rezolin, Inc., of Los Angeles has undertaken the exploitation of its Rezolin tool material for sheet metal dies. One of the manufacturers in the Detroit area is now making large body panels with Rezolin dies. This is perhaps the first major application of the technique and its success may spur others to try out the revolutionary method. These initial installations should provide a better gage of the life and durability of plastic dies, although it is obvious that both properties must be high if a large manufacturer is willing to cast his lot with a new development.

Shell Molding

Foundry circles are buzzing with information on shell molding, one of the most revolutionary techniques to emerge in many years. Consensus appears to be that Ford Motor Company is reaping major benefits from the process but is biding its time before making any disclosures. According to current reports Ford is making crankshafts and small parts in large volume. Considering the nature of the process, the ability of maintaining close tolerances and excellent alignment, it is obvious that ultimately a manufacturer could make some dramatic improvements in cost economy and in overall processing. For example, if a crankshaft casting can be held to size, as is intimated, the amount of stock removal could be drastically reduced. And that could easily lead to a simplification in crankshaft turning and grinding operations as well as in the nature of the equipment required for this pur-

Heavy Duty V-8 Engines

There is evidence that motor truck manufacturers will require larger capacity V-8 engines — gasoline and Diesel—in the near future for heavy duty models. As in the case of automobiles, the V-8 becomes of major importance in reducing hood height and length, the shorter hood length making it possible to change weight distribution on certain models and thereby shift a larger percentage of payload onto the front axle. In the case of heavy concentrated loads, it would be possible to greatly increase GVW without encroaching upon axle loading restrictions.

At the present time Ford has avail-

(*Turn to page* 82, *please*)

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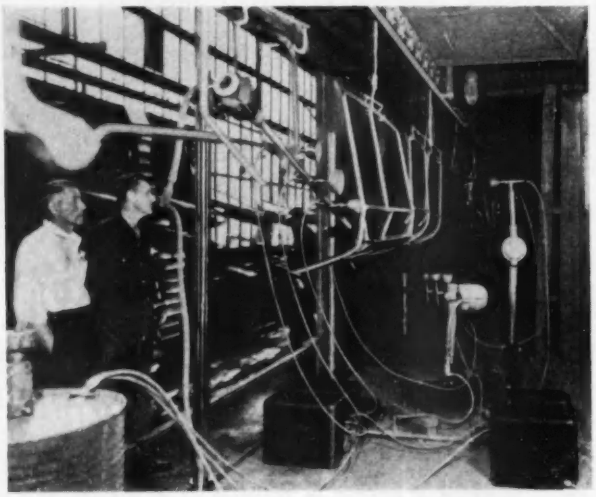
Electro-Spray Process Saves Time and Paint

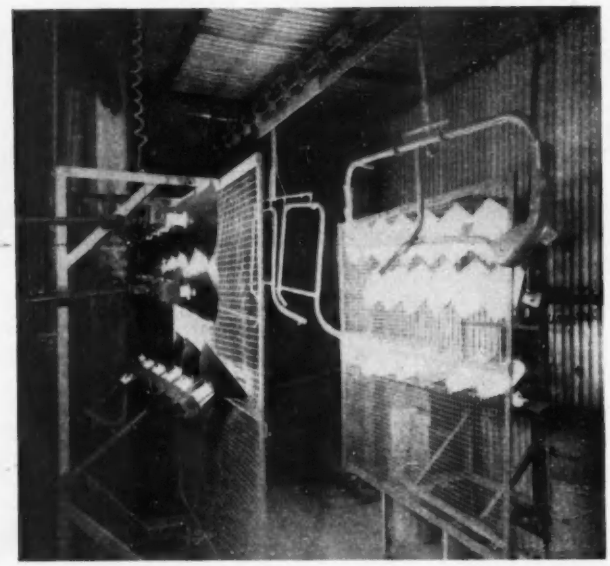
By

GENE ANDERSON

Plant Manager, Franklin, Indiana, Plant, Arvin Industries, Inc.



Setup for finishing automobile seat frames by the Electro-Spray process.



Infra-red bank speeds drying of gray enamel on seat frames.

SUBSTANTIAL savings over previous painting methods have been achieved at the Franklin, Ind., plant of Arvin Industries, Inc., by use of the Electro-Spray process for finishing automobile seat frames and a wide variety of replacement tail pipe.

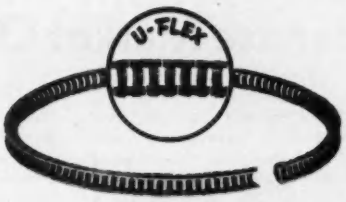
Several types of seat frames are made by Arvin for the automobile industry. The frames are formed of one-in. tubing and coated with gray, quick-drying enamel. In the former flow-coat operation, excessive paint "puddled" at the welded joints; ran inside the frames through drilled holes and often failed to dry completely in the time available. Carry-out often was excessive — showing up sometimes at the automobile assembly lines.

The Ransburg No. 2 Electro-Spray process completely corrected this condition, and also reduced cleaning and maintenance labor. It contributed to general plant safety by eliminating the drain boards and paper floor covering along the conveyor line. In addition, approximately 600 sq ft of floor space was saved when the old equipment was replaced.

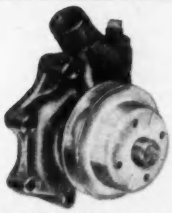
The Ransburg unit at Arvin consists of two triple heads—one on one side of the line and the other located at a lower level under the line—and one single head on the opposite side of the line. The No. 2 process employs a new method of atomizing liquid coatings. A hollow, cone-shaped head replaces the more familiar type spray gun. As the head rotates, the liquid coating is metered at a constant rate of the apex of the head—spreading uniformly over the inner surface and flowing to the outer edge. A source of electrostatic high potential — having one terminal grounded and its other terminal con-

(*Turn to page 98, please*)

parts you can take for granted



U-FLEX OIL CONTROL PISTON RING



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If you are having trouble with engine parts—if you need a better, more dependable supplier, write or call.

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SPECIAL PRODUCTS DIVISION

Japanese Market Opened to New European Cars

JAPAN'S automobile industry, confronted with increasing foreign competition, today faces the choice of fighting its way alone or joining hands with its rivals. The issue reached a climax in July when new European automobiles were made available to Japanese purchasers for the first time. Previously, the only new cars which Japanese were permitted to buy were those made or assembled in Japan. They still cannot purchase new American cars, but may obtain them second-hand. An exception to this rule is the Henry J which can be bought new as well as second-hand as the maker has an assembly plant in Japan.

One group in this country's automobile industry contends that Japanese automobiles can't compete with foreign imports. They prefer to ally with foreign manufacturers to the extent of assembling their automobiles in Japan, which would mean the virtual end of the production of Japanese passenger cars.

Many major producers already have crossed lines and joined the opposition. Fuji Motors has aligned with Chrysler, and Hino Diesel has joined with Renault of France.

Nissan, maker of Datsun cars, and Toyoda, manufacturer of Toyopet automobiles, have exerted strong opposition to this trend. They want to foster the domestic car industry to the last ditch. Both turn out midget cars, in addition to trucks. This group seems to be fighting a losing battle. The fact is the Japanese, who produced the World's largest battleship, just haven't been able to produce a good automobile, and it is in the midget field that they face the toughest competition from Europe's light cars.

Unconfirmed reports circulating in Tokyo say Nissan is negotiating with Austin of Britain for a cooperative arrangement. J. V. Gray, Austin's Far Eastern representative, was in Japan in July and reportedly discussed an alliance between the two companies. If a final agreement is reached, and Nissan allies with Austin, Toyoda will be the sole manufacturer of Japanese-made passenger cars. The combined competition would make Toyoda's position virtually untenable, and American manufacturers can be expected to increase the pressure.

As mentioned above, Kaiser's Henry J is being assembled in Japan and sold locally. Both Ford and General Motors had plants in Japan before the war and may wish to resume those operations.

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Vibration Firm Opens West Coast Laboratory

Robinson Aviation, Inc., Teterboro, N. J., announced recently that their West Coast engineering office at Burbank, Calif., has established an engineering laboratory with full test facilities for evaluating vibration control equipment used in the air frame and electronics industries.

The research, development and test facilities now available on both coasts are expected to reduce both delivered costs and the time required to complete design and manufacturing projects.

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"DETROIT" Universal Joints, backed by 40 years of specialized experience and 50,000,000 installations, are the leader in their field. Successful products —those incorporating basic improvements and manufactured to rigid standards of quality—must expect imitation. "DETROIT" Universal Joints have been imitated, but never duplicated.

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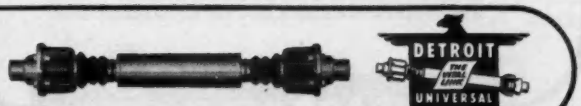

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Close Tolerances

(*Continued from page* 35)

dyed black to prevent reflections within the optical system. In addition, all parts are impregnated with special resins to promote complete tightness and soundness. Aluminum parts are given this treatment in large autoclaves, then baked in Gehnrich ovens.

Following assembly in the air-conditioned rooms the instrument is tested and calibrated in massive inspection machines to preserve accurate alignment. However, after this has been completed, each instrument is then mounted on a Simplicity vibrator and vibrated vigorously. Then it is inspected once again.

The vibration test serves several important functions. In the first place, the instrument must be capable of perfect behavior in a tank moving over all manner of terrain. In addition, this final test must demonstrate undisturbed functioning of the optical system as well as freedom from dirt.

It may be noted in passing that when the Ordnance specialists talk about dirt in the optical system, they mean perhaps a single microscopic particle which is not obvious to the untrained naked eye — and not metallic chips or lint. A single particle of this size may be enough to upset the accuracy of the optical system and is reason for rejection of the entire mechanism.

Oil Progress Week Set for October

Oil Progress Week is scheduled to be observed Oct. 12 to 18. The fifth sponsored by the Oil Industry Information Committee of the American Petroleum Institute, its sole purpose is to help the U. S. public get a better understanding of the oil industry.

Among thousands of individuals who will participate in this unique demonstration will be service station owners, managers and employees, bulk plant operators, refiners, transporters, producers, and industry executives.

Sundberg-Ferar Named Consultant to Reo

Reo Motors, Inc., has appointed Sundberg-Ferar, Detroit industrial designing firm, as design consultants. The company will collaborate with Reo in design and styling motor trucks and other products.

New!

VERTICAL PRECISION BORING MACHINE BY EX-CELL-O

The new Ex-Cell-O Style 425 Vertical Precision Boring Machine.

A Flexible, Automatic Machine for Precision Boring, Turning, Facing

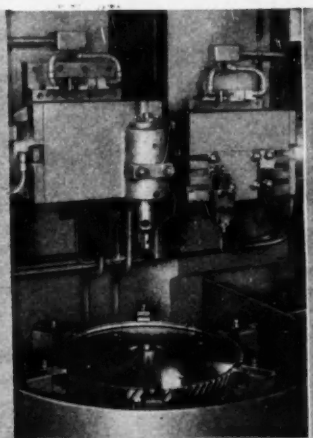
Developed by Ex-Cell-O, this standard Style 425 Vertical Precision Boring Machine is massive and versatile. It has a heavy-duty, high-speed work spindle and rigid tool slides for close-tolerance work with a fine surface finish. It's designed for accurate production work on large parts.

The heavy cast base supports a column on which two vertical slides are mounted, each carrying a cross slide. Slides are operated by large hydraulic cylinders and move on hardened and ground steel ways. Vertical slides are fully counterweighted. All these features mean smoother operation.

The large work spindle supports a 36-inch diameter table having T-slots for mounting fixtures. The table is driven through a precision worm at variable speeds up to 500 rpm.

The machining cycle is completely automatic, including movements of vertical and cross slides, changes in work speeds, flow of coolant, and lubrication.

For more information and complete specifications on this new machine call in your Ex-Cell-O representative or contact Ex-Cell-O in Detroit today.



Close-up view of the Style 425 equipped for operations on an aluminum jet compressor wheel. Tools in the left slide precision bore, counterbore and chamfer the central hole, then feed-face the small hub. The right slide finishes a rabbet in the large outer rim.

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52-23

Packard Marine Diesel Engines

(*Continued from page* 44)

starting when the engine is cold.

Navy engines described here are supercharged by means of a General Electric turbocharger assembly mounted at the end of the block. This assembly carries a large air cleaner at its outer end. Exhaust gases are directed to the turbocharger in a smooth contoured flow with a single manifold in the case of the six and two exhaust manifolds in the case of the V-12. Boost is of the order of 20 in. gage or 50 in. absolute.

Special attention has been given to assure delivery of exhaust gases to the turbocharger with a minimum of heat loss. This is of major importance considering that the manifold itself is watercooled to reduce radiated heat as well as to protect personnel working around the engine. To accomplish this, the manifold casting is fitted with an internal tube of stainless steel for conducting exhaust gases. The diameter of this tubing is such as to provide a suitable air space between it and the inner wall of the water-jacketed manifold. This reduces heat transfer to the minimum, and assures maximum efficiency for operating the turbocharger.

Volumetric efficiency, on the other hand, is maintained at the maximum level by leading the compressed air charge from the compressor through the heat exchanger for cooling before entering the induction system.

Main bearings are of steel-back, interchangeable type, silver-plated on the steel. An overlay of a thin coating of high-lead and tin is plated over the silver to afford protection against scoring and corrosion. This type of bearing stems from PT engine practice which proved highly successful during the last war.

The lubrication system is of dry sump type for marine installation, with full pressure feed to bearings and other major points. Cylinder wall lubrication, as well as lubrication to the piston pins, is by splash feed. The engine is provided with an oil filter and strainer, together with a lube oil heat exchanger, these parts being detached from the engine for the Navy installation.

The engine, including exhaust manifolding and turbocharger, is fresh water cooled. The heat exchanger is cooled by circulating sea water, the engine being equipped with both fresh water and sea water pumps. As illustrated, water jackets are of ample size, providing adequate cylinder barrel cooling. Cooling water is arranged to enter the jackets at their lower ends, progressing upward through the cylinder head where it flows through the streamlined passages around the valves, then out of the head by means of a header.

The timing gear arrangement may be seen in the longitudinal section of the V-12 engine. This is a projected section showing the gearing for one bank, driven from the main gear off the end of the crankshaft. An interesting feature of this arrangement is the use of anti-friction bearings throughout the timing gear layout. This assures prompt breakaway with cold starts, as desired by the Navy, without having to rely upon full lubrication protection. Incidentally, the Navy engines are started with air motor starters, although conventional electrical starters will fit interchangeably.

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Whatever your spring requirements may be — see Tuthill first!
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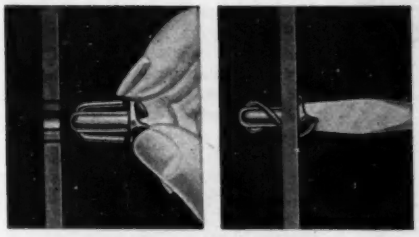

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...Or a removable fastener. It locks and unlocks with a 90° clockwise rotation. No mating parts such as nuts or receptacles are required.

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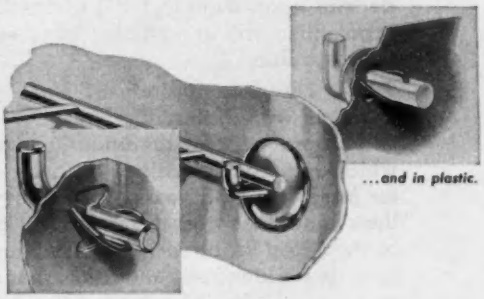
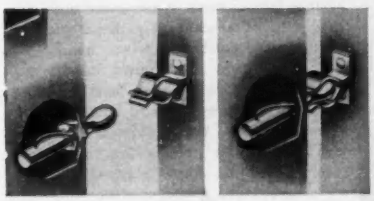


...and in plastic.

Both in metal...



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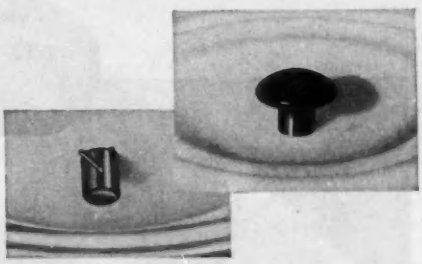

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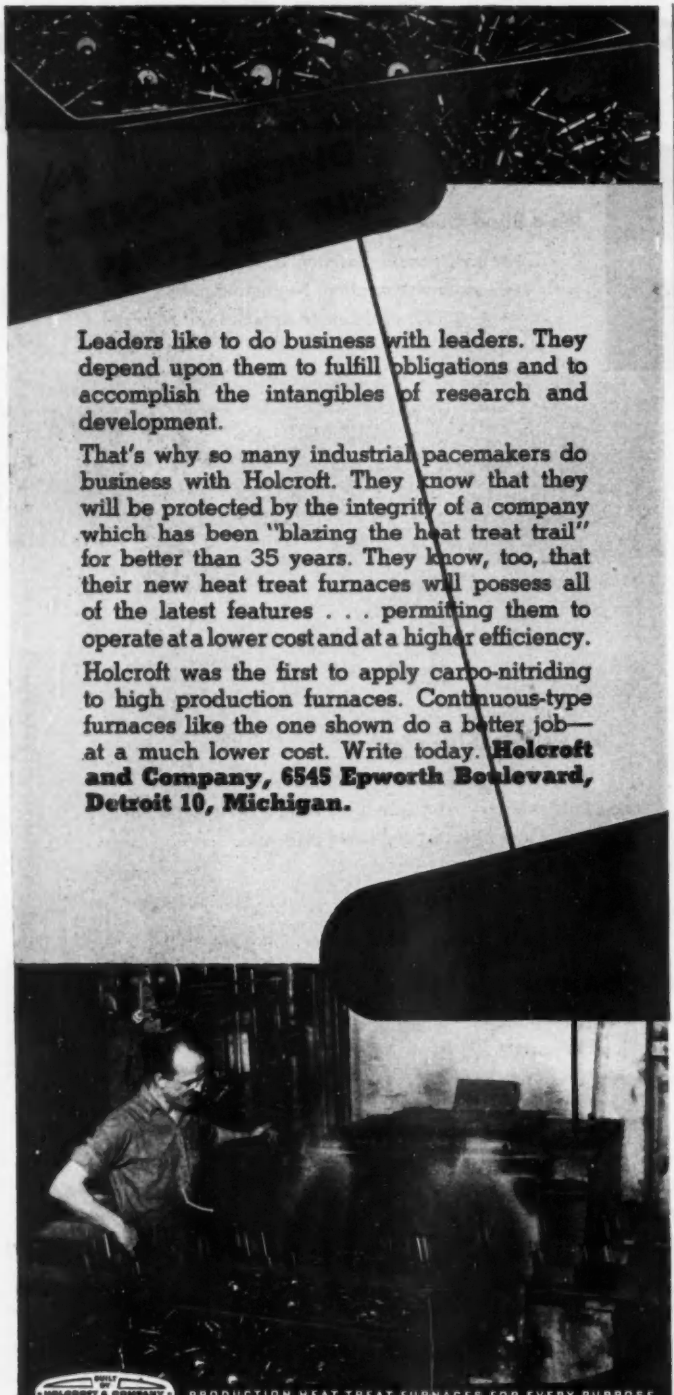
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Fageol Engine

(*Continued from page* 45)

tor receiver and the chain housing, if unprotected, would be subjected to accelerated wear. Use of 5/16-18 inserts in through holes in the chain housing and ⅜-16 inserts in blind holes in the distributor receiver eliminate the necessity for thread repairs.

Reinforcement of spark plug threads was, of course, mandatory. These threads have to withstand the required 25 lb-ft installation torque. In addition, cleaning, readjusting and replacing of plugs calls for a wear-resistant thread. Normally, such an application employs standard length aviation spark plug thread inserts.

In this case, however, these standard lengths were not suitable. Automotive spark plugs were used because the electrodes of the longer aviation plugs would project too far into the combustion chamber.

Redesigning the combustion chamber or increasing the cylinder-head thickness was not practicable. The Model F-200 engine had to duplicate the displacement characteristics of Fageol's standard engine, and economy dictated use of the same mold for casting the aluminum head as had been used for the cast-iron head.

A solution was found in the use of 14-mm aviation-type inserts having a shorter-than-standard length to correspond to the automotive plugs. These inserts have a serrated upper edge which, when staked into the tapped hole, gives double assurance that the inserts are permanently locked in place.

OBSERVATIONS

(*Continued from page* 72)

able its big V-8's for the larger tonnage truck models. And Chrysler Corp. doubtless could adapt Chrysler, DeSoto, and Dodge V-8's for the heavier tonnage Dodge trucks.

Commercially, however, there are few large output V-8's currently available. Hall-Scott has been supplying for some time large V-8's for West Coast equipment. Otherwise, about the only V-8 gasoline engine on the market is the one made by LeRoi which was recently adopted by Autocar. Considering the potential demand for V-8's, the situation unquestionably merits study on the part of engine builders to determine how far they can go and how soon such engines can be made available.

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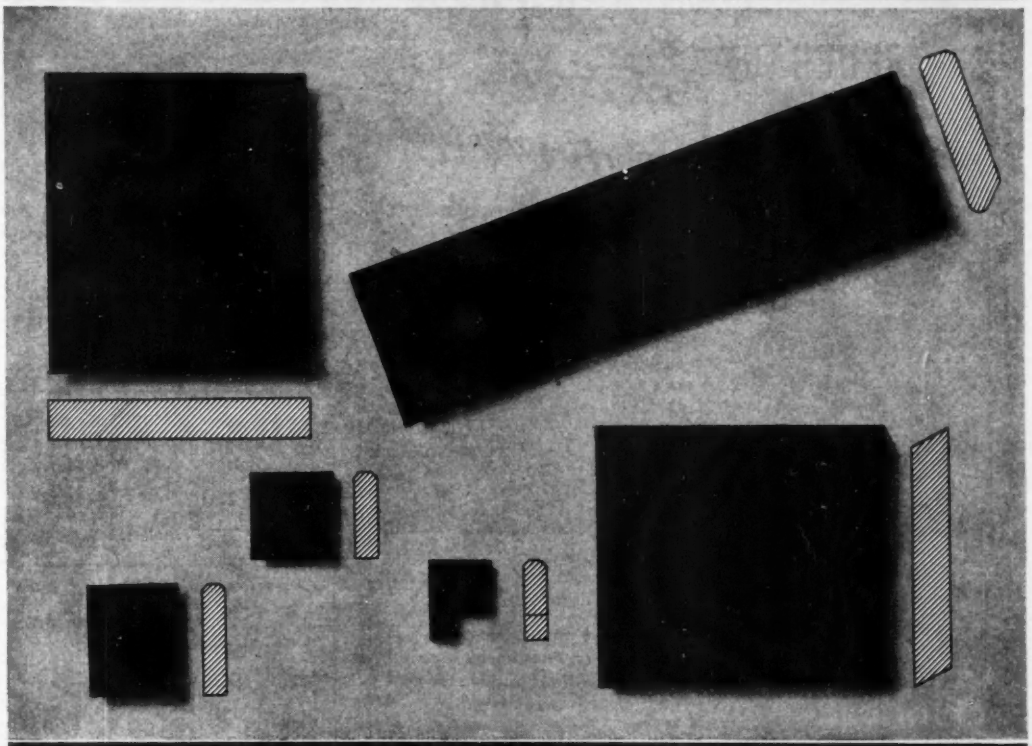

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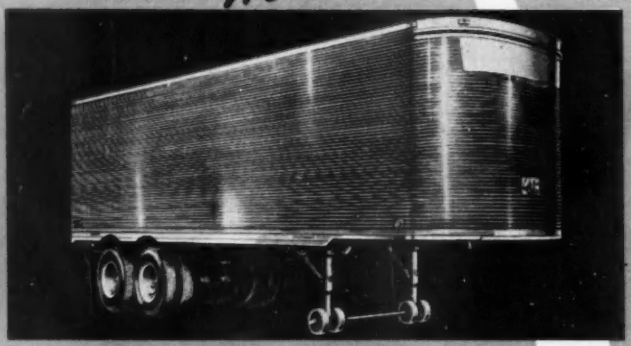

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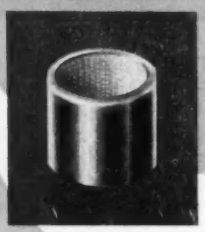

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Ignition Problems

(*Continued from page* 49)

creepage gap system is shown in Fig. 1, directly below.

Requisites of a creepage gap system are that it must deliver high peak energy pulses to the spark plugs, energy must be released in a concentrated form, and the voltage at the spark electrodes should be kept as low as possible to assure satisfactory current supply. Spark plug electrodes must have a very small gap in order that it can be bridged by a low voltage.

A semi-conductor must be installed between the spark plug electrodes to allow the gap to be bridged at low voltage.

Four of the methods of installing the semi-conductor between the electrodes are shown in Fig. 2.

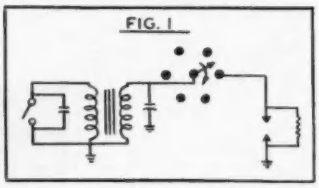

Fig. 1—Creepage gap ignition system basic circuit.

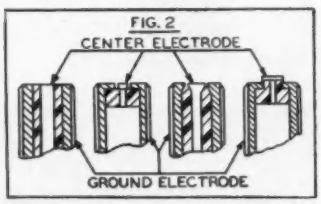

Fig. 2—Four methods of installing the semi-conductor between electrodes.

Upon the application of the voltage between the center spindle and the shell, an ionization path is created between the two electrodes which permits the energy stored in the condenser to generate a spark at the annular creepage gap.

In this country the creepage gap ignition system was successfully introduced as applied to the jet engine in 1949, and is at present in production.

Three main reasons can be mentioned as having made this application so successful:

(*Turn to page* 88, *please*)

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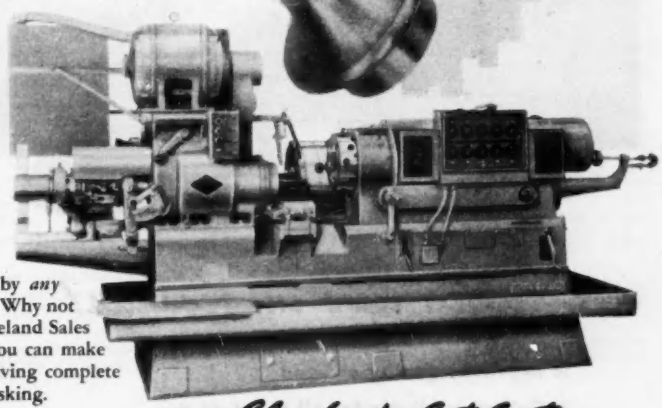

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A Fast, Accurate Method for Detecting Leaks

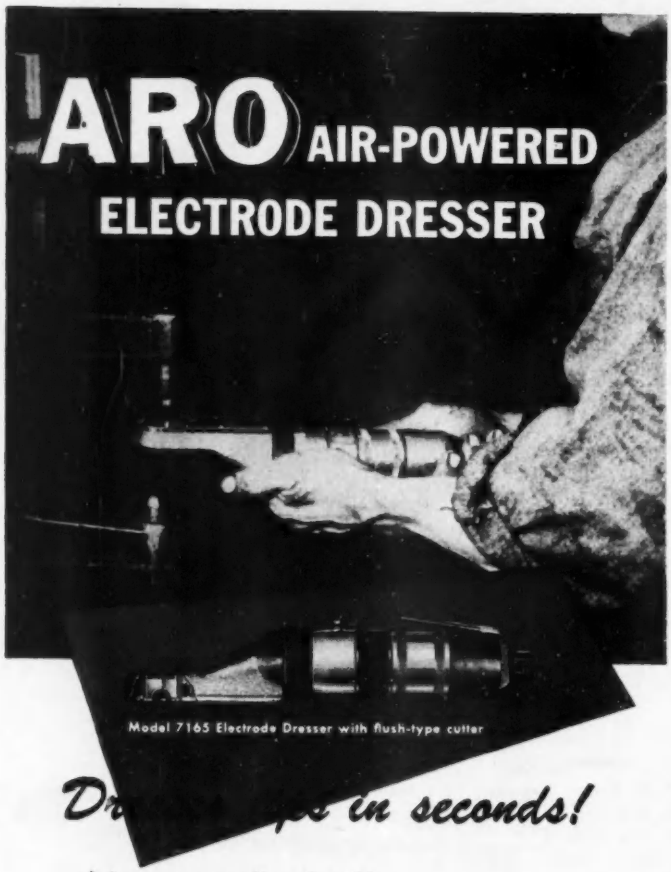
(*Continued from page 56*)

lapsing the tank with vacuum. Metallic floats of any type can be tested by the transfer chamber method in a practical manner as mentioned previously. Manufacturers of floats have the problem of getting the floats sealed absolutely tight.

Certain ordnance parts have been tested nicely. One part in particular has one enclosed cavity and one open cavity requiring two tests. These tests are arranged to operate in sequence automatically. On the ordnance part, it was found that vacuum testing was much faster and, at the same time, more accurate; that is, more leakers were caught than by the testing originally specified. Brass castings and aluminum castings, as well as die cast parts and molded plastic parts, can be tested by vacuum. Centrifugal castings can be tested easily, particularly a test for porosity, because of the difficulty in getting homogeneous section throughout the walls of the castings. Welded containers of a variety of shapes and sizes can be tested by vacuum readily. Even storage batteries can be tested by vacuum to determine whether they leak or not, and whether the seal around the top cover is satisfactory. Another important field for vacuum testing is the checking of gasketed assemblies where there is a possibility of leaks at the gaskets. Vacuum testing enables completely sealed parts to be tested without the risk of getting a test fluid, which may be contaminating, inside the part. Dry vacuum testing is a must where parts are tested during the production process and subsequent operations of painting, transferring decals and further assembly requires that the part be dry.

The possibilities of applying vacuum testing to many parts are just beginning to be explored and there are many applications which have not been uncovered. Many of the applications are found throngh the need for an improvement over some other method, or lack of any method of testing.

The future possibilities of vacuum testing are considerable. Current developments are along the line of improving the gauges, or indicating equipment, and it is very possible that higher vacuum ranges may be applied to parts vacuum tested. Developments along these lines are underway at the present moment. A machine is presently being developed for measuring the volume of combustion chamber cavities in engine cylinder heads to within plus or minus 1½ cc. Other and new applications will be developed in the future, making it possible to cover even wider fields. The popularity of vacuum testing is attributed to the fact that fundamentally vacuum testing is simple; it is clean; it is very productive; it is safe; and it is low in cost per part tested.



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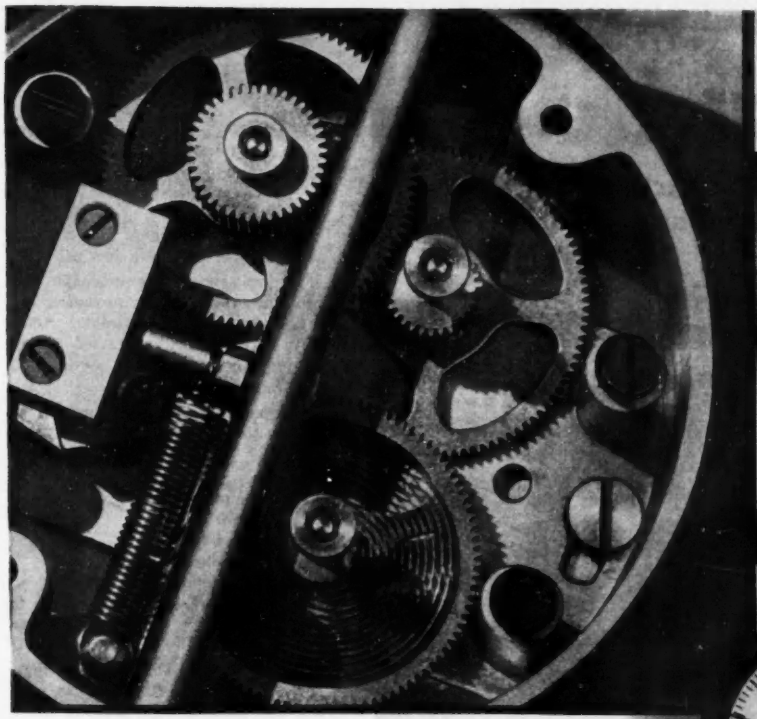

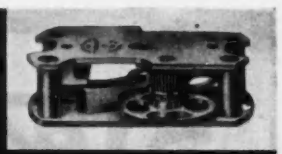

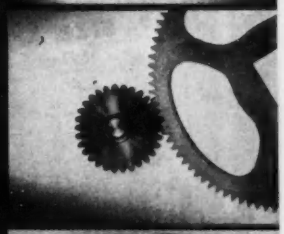

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(Top to Bottom)

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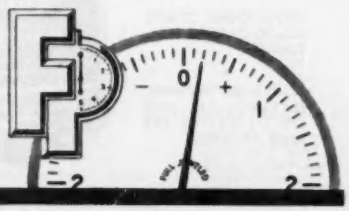

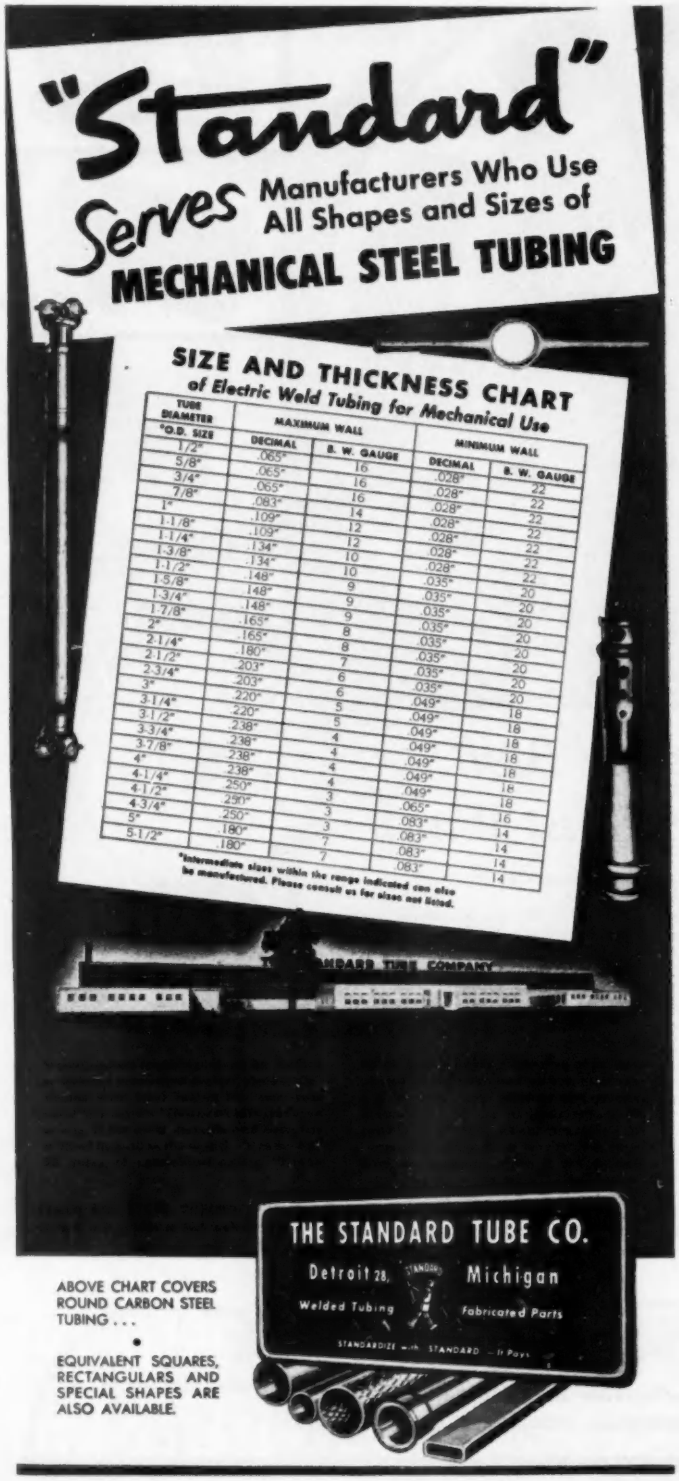
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EQUIVALENT SQUARES, RECTANGULARS AND SPECIAL SHAPES ARE ALSO AVAILABLE.

Ignition Problems

(*Continued from page* 84)

(1) Due to the intermittent duty cycle, the total operating time of the igniter plug is relatively short.

(2) The number of sparks per second is very low.

(3) The pressure in the combustion chamber is only a few psi.

Application of the creepage gap ignition system to reciprocating engines also is very desirable. Actually, this work was started before use of this system as a jet ignition was contemplated.

The advantages of this system as seen at that time, and still true today, are:

(1) Low voltage distribution.

(2) Complete freedom from spark plug fouling.

(3) Light weight.

(4) Easy installation.

(5) High temperature range.

(6) High preignition range.

(7) Possibility of igniting leaner mixtures.

When used in high speed, high power engines, this system has only one big disadvantage, that is *short life.*

Three basic problems must be solved before the system can be used effectively on reciprocating engines:

Erosion of the semi-conductor due to the heavy and rapid discharge of the energy over its surface is the first problem. Effect of this discharge on the semi-conductor is best illustrated by stating that diamond dies, which are used in the drawing of very fine copper wires, are drilled by discharging a condenser between a needle point and the diamond proper, after submerging both the needle point and the diamond in a conducting solution. The purpose of the solution is both to make an electrical contact and at the same time to confine the discharge to a small area of the die where the hole is to be drilled.

In the reciprocating engine cylinder the compression of the gases has the same effect as the solution abovementioned, i.e., prevents the spark from dissipating its energy away from the surface of the semi-conductor. Thus, after a relatively few hours' operation, the spark succeeds in cutting a fine groove in the semi-conductor between the center spindle and the shell, thus causing ignition malfunctioning.

Maintaining perfect contact between the semi-conductor and the

(*Turn to page* 90, *please*)

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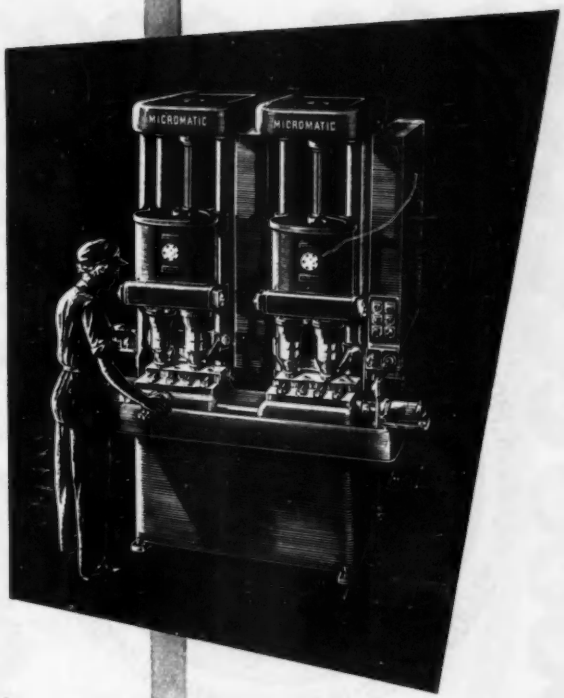

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Ignition Problems

(*Continued from page 88*)

metal electrodes of the creepage gap plug at high temperature is second. Of necessity, the semi-conductor belongs to the general class of the ceramics, which have less expansion than the metal group. There are, however, certain metals which have approximately the same expansion coefficient as semi-conductors at relatively low temperatures. This mating of the parts helps in maintaining the desired contact, however, at the cost of lower erosion stability of the metal parts. New metals with lower expansion coefficient at higher temperatures are highly desirable for the solution of this problem.

Low voltage distribution is the last major problem. A low tension distributor system of the carbon brush type is not adaptable to this system for three reasons:

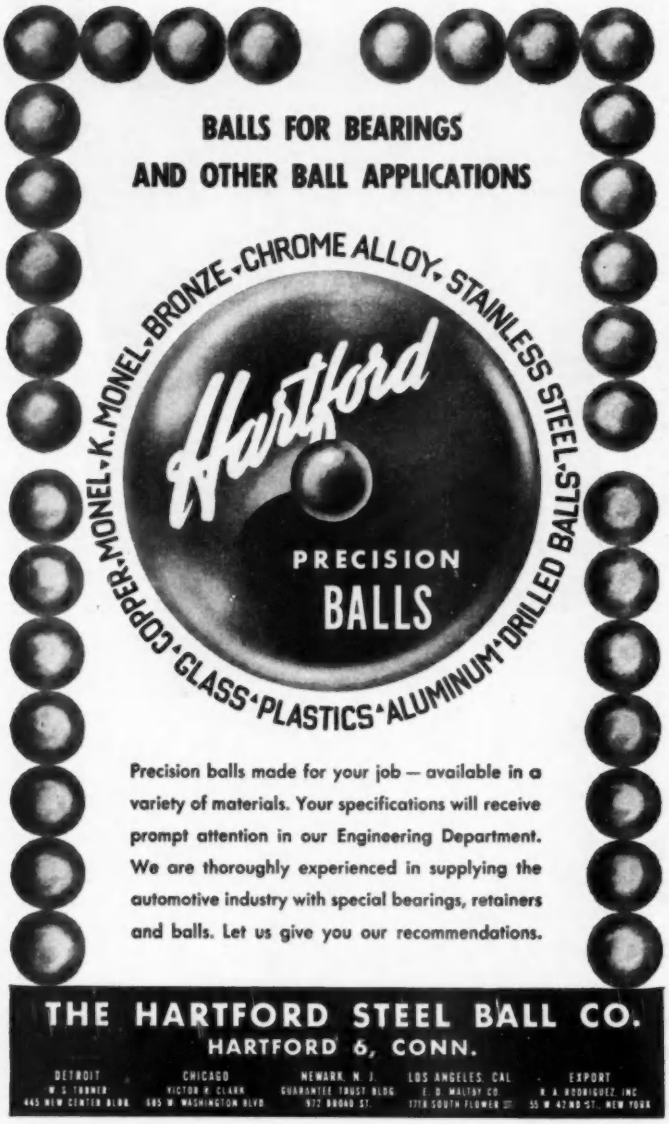
(1) The rapid discharge of the condenser with its inherent high peak current and the relative high resistance between the carbon brush and the segment causes rapid pitting of the metal parts.

(2) The voltage in the order of 2500 v would require wide spacings between the fixed distributor electrodes. Still, flash-over between electrodes could be expected, with the accumulation of carbon dust or moisture, or at high altitude.

(3) A jump gap distributor system is not practical inasmuch as the above voltage would require a very small gap distance between the rotating finger electrode and the stationary distributor electrodes. This was a baffling problem for a long time. Today the solution of same seems to be at hand; laboratory tests have been conducted for some time with good results, and the performance of same is very promising.

The normal metal finger electrode is replaced by the modified end of a creepage gap spark plug. One electrode of same, preferably the outer one, is connected to the storage condenser, while the center electrode is connected in series to a small condenser, which is paralleled by a resistor, and a sealed gap to ground.

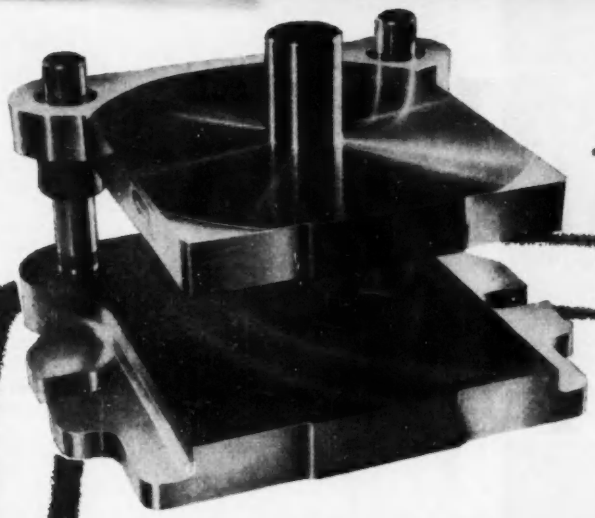
As the storage condenser reaches its full charge, the voltage across the gap breaks same down, thus causing the series condenser to be charged. The charging current is sufficient to ionize the gap between the distributor finger electrode and the stationary electrode, thus permitting the storage condenser to discharge across the gap, which can be as high as 0.040 in



Vanadium Pilot, Production Plant for Alloys to Open

Vanadium Corp. of America will begin the production of alloys shortly at a new, modern plant now under construction at a 120-acre site near Cambridge, O. In addition to a three-section mill building containing electric arc furnaces for producing alloys, the Ohio plant will contain general offices, a research laboratory and a pilot plant for the development and testing of new products.

Vanadium Corp's aluminum alloy-producing division will be moved to a new plant late in August from the leased Chester, Pa., plant which has been returned to the Government. Initial operations in Cambridge will consist of the melting of secondary aluminum and the manufacture of aluminum alloys. The production of ferro vanadium, grainal allays, low carbon ferro titanium and other alloys is scheduled to begin at the new Cambridge plant in the spring of 1953.



DANLY DIE SETS

helped FORD retool for '52

Somewhere behind the scenes in almost every outstanding mass production operation, you'll find Danly Die Sets at work . . . saving time in the die shop and assuring longer production runs in the press room. Danly Die Sets are the first choice of diemakers everywhere.

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INDIANAPOLIS	4	5 West 10th Street
***LONG ISLAND CITY**	1	47-28 37th Street
***LOS ANGELES**	54	Ducommun Metals & Supply Co. 4890 South Alameda
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**Indicates complete stock*

DANLY®

DIE SETS AND DIEMAKERS' SUPPLIES

Ask Yourself:

1 ***Do we have hand operations that could be mechanized?***

2 ***Is inferior mechanization hampering any operation?***

3 ***Can we use a greater degree of automatic control?***

4 ***Could we combine several operations into a continuous process?***

If your answer is yes, then you are not producing as fast and efficiently as you can

. . . and the immediate importance of your answer is this: from now on, your success as a manufacturer will depend more and more upon the degree of mechanization in your plant.

Too often, today, advances in mechanization are confined to breaking a production bottleneck, or matching a competitive process.

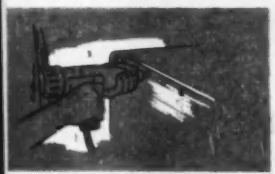
Let's look a bit further—at replacing these sporadic improvements with a *planned* mechanization program.

The results are cumulative. Progressively, each operation is lifted to a higher level of mechanization on a sound economic schedule.

You are insured against tomorrow's competition. Manpower and scarce materials are conserved. Your profit position is strengthened.

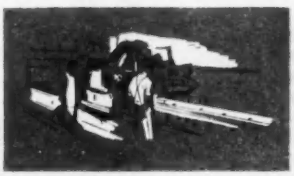
To help you plan your mechanization, General Electric offers a new guide. We call it "Progressive Mechanization." It's a "More Power to America" program—another way to increase industrial productivity by spreading the knowledge of modern industrial techniques.

HERE ARE THE FOUR STAGES OF PROGRESSIVE MECHANIZATION

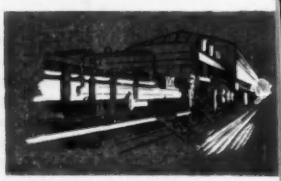


1 Simple Mechanization—simple machines driven by power—like this electric tool.

2 Improved Mechanization—more complex, like this drilling machine. Motors and controls aid manual operations.

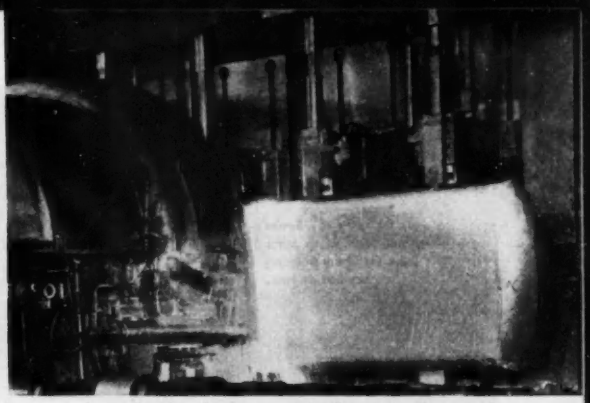


3 Automatic Control—machines that have adjustable-speed with "push-button control," like an automatic welder.



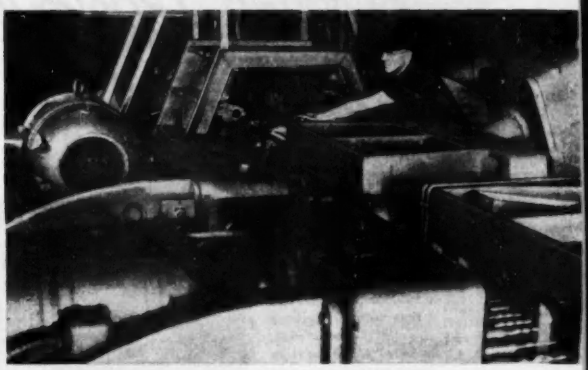
4 Continuous Process—machines co-ordinated for "start-to-finish" production.

Simple mechanization—example: Lightweight electric impact tool tightens nuts in 1/10 the time a hand wrench takes.



Improved mechanization—example: Special milling machine replaces lighter type—"scalps" aluminum billets 5' wide 10' long.

Automatic control—example: Adjustable-speed beer-can filling machine will change rate of production to meet any condition.



Continuous process—example: 216 operations are made on cylinder block in 36 seconds by automatic-transfer-type machine.

How you can improve production in your plant with the G-E Progressive Mechanization Program

START OFF with a "launching ceremony"—have all of your engineers and key people see the full-color movie "Motors in Industry." You'll drive home to them the importance of improving mechanization in your plant.

This informative film has more than 40 interesting mechanization case histories. Shots from four of them are pictured above. They are just a few of the examples that you can use to stimulate interest in mechanizing *progressively*.

CHANNEL THIS INTEREST—do some practical, organized probing into your present production methods. General Electric's Progressive Mechanization manual may help show you the way. Hand out the special mechanization survey forms. You can use them to enlist the participation of as many persons as you wish, including the men "at the bench."

WANT TO LEARN MORE? You get a free copy of the Progressive Mechanization manual, and indicate interest in seeing "Motors in Industry," just by sending in the coupon below. Or contact your nearest G-E Apparatus Sales Office.

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Here's a complete course, covering the fundamentals of motors now available. It explains how to select and supply motors, what sort of control to use. Your local G-E representative can make arrangements for you to use this course.

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- ☐ Seeing the motion picture on Progressive Mechanization.
- ☐ Using the "Motor Selection & Application Course."

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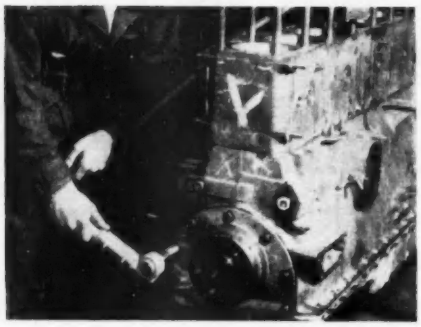
Buckeye "B" Series grinder removing burrs from flywheel housing for bus engine.

"...because Buckeye Tools stand up better"



Running in cap screws on a truck engine takes less time with this Buckeye "B" Series wrench. Buckeye "C" Series right angle wrenches are also used for this type of work.

A West Coast manufacturer of truck and bus engines buys portable air tools solely on the basis of performance—and uses Buckeye wrenches, grinders and drills in production and assembly work. In placing a recent order for Buckeye drills, the plant engineer said, "We use a lot of air tools here and have found over a period of years that Buckeye tools give us less trouble and stand up better."

Buying air tools on the basis of performance alone is simply good business—particularly when you can test Buckeye tools in your own plant, on your job, without obligation. Write today for your copy of our Air Tools catalog—and start now to save time and money with Buckeye tools.

Buckeye Tools CORPORATION
DIVISION 21, DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

METALS

(*Continued from page* 70)

output totalled 513,191 tons against 534,225 tons in 1951. On the other hand, foreign crude increased 24,000 tons in the same period. Producers' stocks of copper were somewhat higher at the end of July, totalling 73,657 tons, but this was scarcely more than a three weeks' supply at current rate of delivery.

Cheaper Tin Ahead

Early in August the RFC announced that consumers once more would be permitted to import tin freely from abroad for their own use. The ban on free imports had been strictly enforced since March, 1951. Private imports are henceforth to be allowed for resale without allocation. However, importers still must report receipts, shipments and inventories.

The Government's action was undoubtedly taken because of the vastly improved tin supply situation. World production of tin is approximately 160,000 tons per year, while consumption was only 127,000 tons in 1951. True enough, consumption in U. S. was artificially held down by rigid restrictions on use and strict allocation. Nevertheless, for the last five years tin production appears to have consistently outstripped demand.

RFC will still remain in the tin business for some months and sell tin at the official price of $1.21½ per lb. It's a little doubtful, however, if business will be very brisk at this price. Already the tin price has begun to crumble in London and Singapore in anticipation of a free market. Since July the metal has been selling in London at $1.16 per pound and on the New York Commodity Exchange October futures are quoted at the same price.

Yet it isn't certain that much free tin will be available for buyers. RFC has much of the world supply tied up in long term contracts. In any event, it will take some weeks for private buyers to bring any sizable tonnages into this country. Up to the middle of August no agreement had been made with Bolivia for its output and because of the unsettled political conditions in that country, Washington was a bit puzzled with whom to negotiate. But one thing appears pretty certain. The anguished demands of Bolivian tin producers for a higher price are less likely than ever to win approval.

(*Turn to page* 96, *please*)

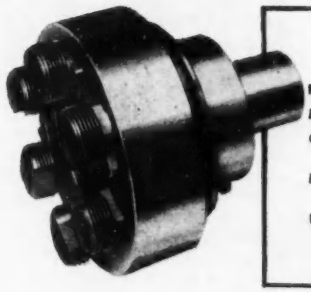
NAMCO VERS-O-TOOLS and COLLAPSIBLE TAPS

SET THE STANDARD

for continuous, high production on rocket tube threading

On this rocket job these Namco threading tools outperformed any other method—in time-saving, in sustained quality and in trouble-free operation. The procedures we helped work out for the first pilot installation have since been *adopted as standard at ten other plants contracting for the same job.*

Regardless of the type of threading work you are doing, may we show you how the same basic principle can be applied to save you time, money and materials—with Namco Vers-O-Tools and Collapsible Taps?



JOB FACTS

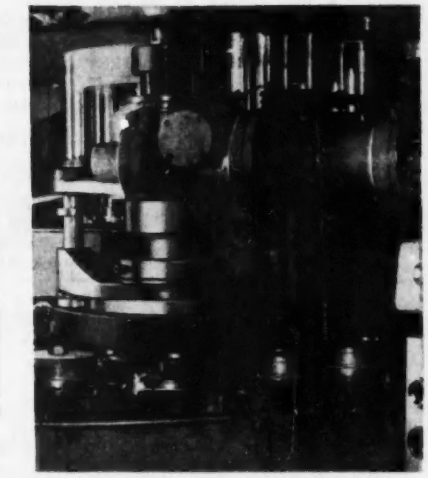
PART—Rocket Nozzle

MATERIAL—X 1117 Steel

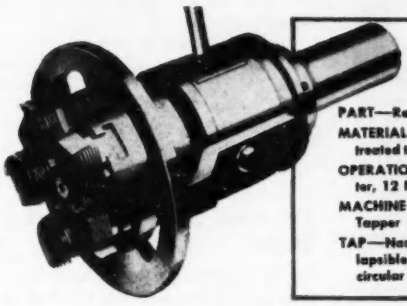
OPERATION—Thread 4¾" Diameter, 12 Pitch, Class 2 Fit

MACHINE—W. F. and John Barnes Drill

DIE HEAD—Namco Type DR 4⅞" Vers-O-Tool with 6 ground thread circular chasers



Namco Type DR Vers-O-Tool Die Head threading rocket nozzles on a W. F. and John Barnes Drill—Firestone Steel Products Division Plant, Akron, Ohio



JOB FACTS

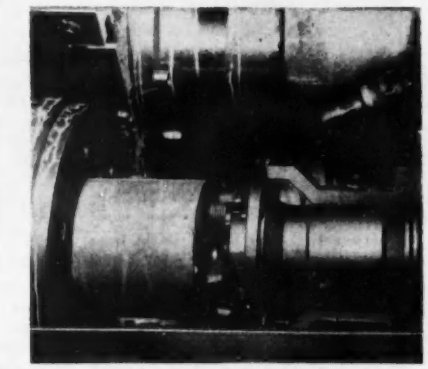
PART—Rocket Motor Tube

MATERIAL—NEA-8620 Steel, heat-treated to Rockwell C-28-30

OPERATION—Tap 4¾" Diameter, 12 Pitch, Class 2 Fit

MACHINE—Lehman Double-End Tapper

TAP—Namco Type RST 5" Collapsible with 5 ground-thread circular chasers.



Namco Type RST Collapsible Tap tapping rocket motor tube on Lehman Double End Tapper—Firestone Steel Products Division Plant, Akron, Ohio

ASK FOR NEW CATALOG DT-52 . . .

for complete information on Namco Vers-O-Tools and Namco Collapsible Taps, available with ground thread precision chasers.

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METALS

(*Continued from page 94*)

Aluminum Price Advanced One Cent

After lengthy deliberation OPS granted a price increase of one cent per lb for aluminum pig and ingot, bringing the new ceiling prices to 19 and 20 cents per lb respectively. This was only half the increase requested by the industry and did not evoke any enthusiasm from producers. It is doubtful if it compensated Alcoa for its peacefully negotiated wage increase with its workers. Unless DPA brings pressure to bear on OPS to raise the ceiling higher, it is unlikely that the proposed third round of expansion will find the companies receptive.

Aluminum production continues to climb, with new records set up every month. Production for the first six months of 1952 was 466,000 tons, up 14 per cent over 1951. DPA forecasts that by the middle of 1953 the supply will be ample for military and most civilian needs. This seems too conservative. Curbs have already been eased for use of aluminum in the building industry. For most users allocations have little significance.

Lead Fairly Firm

The lead market has had a tolerably good undertone, although sentiment was shaken by the weakness in zinc. The two metals usually move in sympathy pricewise. But over the longer term there is ample reason to believe that the statistical position of lead will tend to improve while zinc may deteriorate. There is no indication of important new production of lead from mines either in the United States or Canada, while the contrary is true for zinc.

Great Britain will reinstitute a free market for lead in October on the London Metal Exchange. This announcement is greeted abroad with great satisfaction. The present controlled price of lead in the United Kingdom is equivalent to about 16.3 cents per lb. Lead supplies now are ample in London and trading should be on an orderly basis.

Battery manufacturers again report an increase in shipments. In June, shipments totalled 1,534,000 units — up 400,000 over May, and 100,000 over the same month in 1951, the first time this has occurred in 1952.

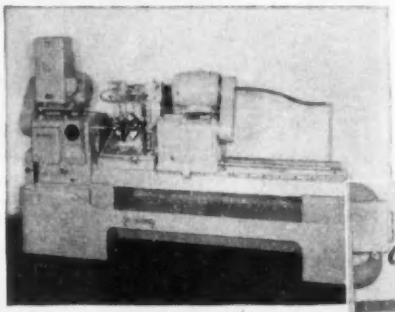
Titanium Still High Cost Metal

Practically no progress has been made as yet in reducing the cost of producing titanium from its ores, although the best metallurgical brains in the country have been engaged on the problem. Titanium in ingot form sells at $5 per lb, with $15 per lb for mill products. In an effort to speed up production, Washington has signed up with du Pont for an additional 13,500 tons of sponge titanium over the next five years. Military requirements exceed the present supply. However, industrial users, while recognizing the merits of the "wonder metal," are not placing orders at present prices. A tonnage market needs a price of about $1 per lb and this appears to be a long way off. It was recently announced that the Dow Chemical Co. would get into the

(*Turn to page 98, please*)

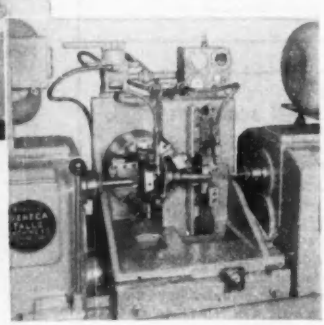
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *So-swing* PEOPLE" SENECA FALLS, NEW YORK



◀ General view of Model CS Centering Machine equipped for centering front wheel pivots.

Close up view of special work holding fixture. ▼



MODEL "CS" CENTERING MACHINE CENTERS FRONT WHEEL PIVOTS ACCURATELY ON HIGH PRODUCTION BASIS

Problem: To center both ends of front wheel pivots without distorting the stem end.

Solution: The Standard Model CS Centering Machine equipped with a special work holding fixture was selected for this job. The work comes to the machine as a rough forging without any previous machining. The work holding fixture consists of a special round chuck mounted on a spindle, yet free to revolve a few degrees on each side of the center line. This prevents any bending of the part when the 2-jaw vise closes on its small end. The chuck and vise jaws are operated with separate air cylinders installed on the rear of the fixture and controlled by a 4-way air valve.

The operator places the rough forging in a loading cradle, against a spring-loaded V-block, which positions it in relation to the opening between the lugs at the large end. The air valve is then operated and the large adjustable stud, fitted to the inclined air-operated cross slide, forces the part back into the stationary V-blocks. A second movement of the air valve closes the 2-jaw air-operated vise. Starting handle is then positioned forward and the machine goes through its cycle automatically. Both ends are centered simultaneously.

Seneca Falls engineers welcome inquiries involving difficult and unusual machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *So-swing*

What's Your Problem?

oil or coolant filtration and handling?

filtering systems for jet or piston-engine test cells?

chip, abrasive or other waste removal?

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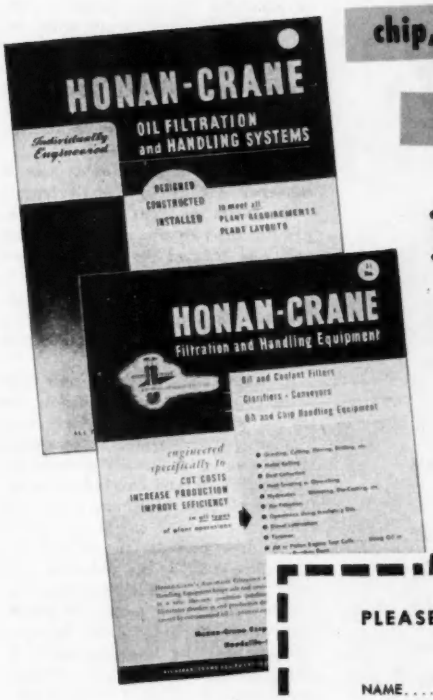

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ACUSHNET specializes in "precision" molded rubber parts custom-engineered to specific requirements.

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titanium metal business at the proper time, thus adding its own highly efficient research staff to the long list of top-flight concerns wrestling with the metallurgical problems.

Electro-Spray Process

(*Continued from page* 74)

nected to the head—creates a strong electrostatic field between the head and the article to be coated, which is grounded by the conveyor. The force of this field transforms the coating material into a spray of fine, charged particles and creates an attraction that pulls the spray particles to the grounded articles. This accounts for complete electrostatic deposition.

Seat frames are carried on a cable conveyor 432 ft in overall length, with frames on six-ft centers. After passing through the automatic paint unit, the painted seat frames move into a drying chamber which is heated by two fan-forced hot air heaters. One bank of infra-red lights on either side of the line speeds this drying process.

Although the Ransburg unit was designed and installed specifically for the seat frames, automotive tail pipes also are painted by this same equipment. The tail pipes are grouped by size and shape and carried on eight-ft centers—four high, one above the other.

Complete records on the former flow-coat method of finishing the units are not available. However, based on one week usage with flow-coat, it is estimated that finishing cost savings now are more than 50 per cent on the seat frames. Although the Ransburg Electro-Spray installation was not designed for the tail pipe operation, Arvin uses the same setup to effect savings of more than 36 per cent over former flow-coat cost.

Allis-Chalmers May Buy La Plant-Choate Mfg.

Allis-Chalmers Manufacturing Co. is said to be negotiating to acquire the plant and assets of La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. The latter company manufactures earth-moving equipment and had sales of $10.5 million last year. Normal employment is between 800 and 900 workers.

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ON NATIONAL FORGING MACHINES!

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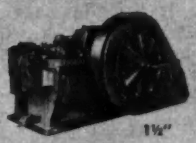
Our broad experience enables us to design and build a line of machines capable of standing up to the toughest forging assignments . . . whether plowshares or high explosive shells.

1"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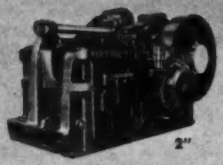
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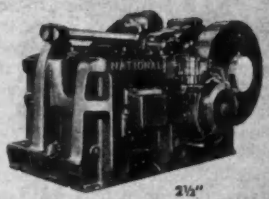
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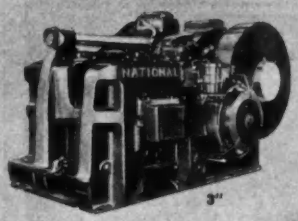
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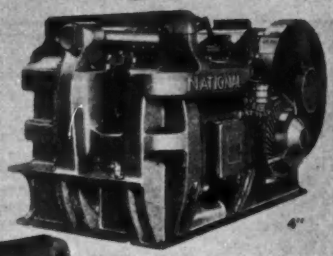
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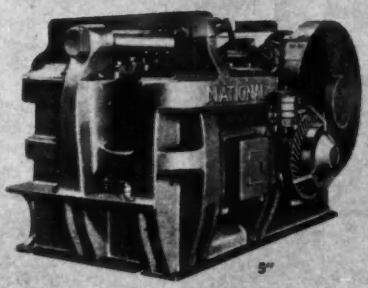
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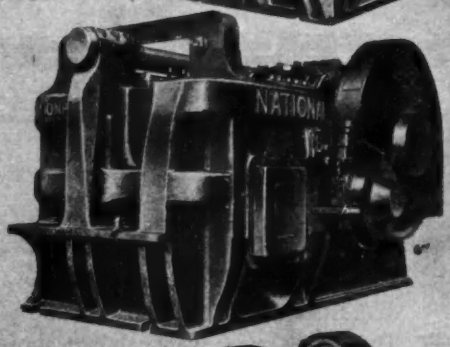
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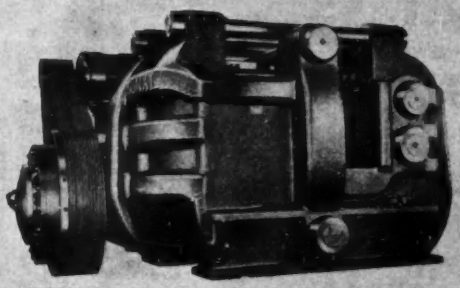
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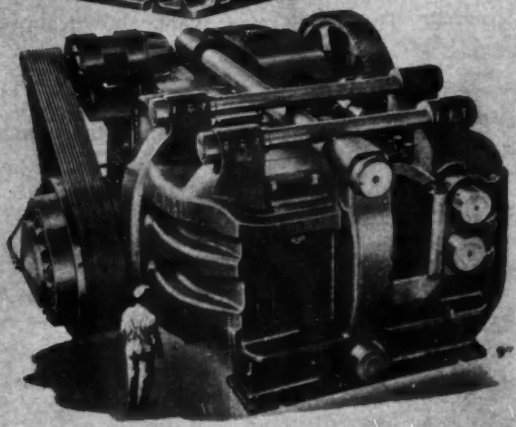
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Hartford **Detroit** **Chicago**

New Welding Process Developed

(*Continued from page* 51)

tective atmosphere is necessary.

Using the equipment described above, the d-c circuit was connected so that the electrode could be positive or negative. The first work was done with the electrode positive on the theory that an electron flow from the work and the positive ion bombardment of the aluminum give an electrical cleaning action on aluminum. Good arcing was observed and satisfactory welds were obtained when the arc voltage was above 20 volts. If the voltage drops below this threshold, no arcing occurs, regardless of the wire size. If the dire diameter or the number of wires being terminated was increased, voltage also had to be increased in order to weld rapidly. In this manner successful welds were made between aluminum conductors in sizes ranging from 0.007 in. diameter through ¼ in. diameter.

Employing straight polarity (electrode negative), welds were made under the same voltage conditions with comparative ease between aluminum conductors up through No. 10 gage. When joining larger wires, however, a magnetic arc flare resulted which caused the arc to be somewhat uncontrollable and consequently made the welding conditions unstable.

All the work with dc, which has been done without a protective atmosphere, has shown the arc to be self-extinguishing. Nevertheless, the operator may maintain the arc at will on the larger diameter wire and multiple wire joints. Trials employing argon gas around the electrode were not too successful because the arc became uncontrollable. An automatically timed current cut-off is necessary if a protective gas is employed.

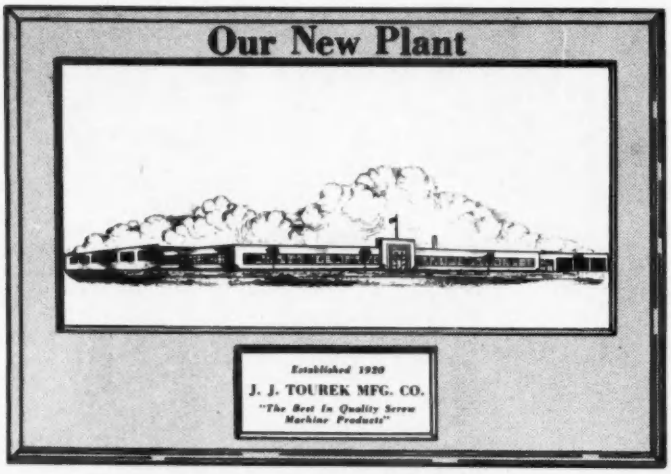
Electrode material has been investigated only to a limited degree. Initial work with a graphite electrode showed quite satisfactory operation and, as a result, there has been little reason to search for a better material. However, welds have also been made employing tungsten and copper as the electrode and satisfactory welds were made.

Experience has shown that a certain mechanical configuration is necessary to obtain good welds. The two or more wires must be in close contact with one another whether twisted or parallel. An ideal situation is shown in Fig. 3A, while three other good relations may be seen in Figs. 3B, 3C and 3D.

The weld bead in aluminum wire generally possesses little strength in itself, so if the joint is to be subjected to any mechanical stresses some support will be needed. In many cases this support may be obtained by the same means which are used to hold the wires in close contact for welding: (1) twisting a pigtail; (2) wrapping an additional wire around the joint; or (3) crimping a sleeve over the wires. Examples of additional joint designs adaptable to this process are shown in Fig. 2.

Copper is one metal which may easily be joined to aluminum by this method. Inherently, however, the alloying of copper and aluminum results in a brittle combination so that this weld must be protected mechanically. A more ductile joint is obtained when the percentage of copper is under 20 per cent. An aluminum

(*Turn to page* 102, *please*)



The new Tourek plant, shown above in an artist's drawing, is now turning out vast quantities of precision screw machine products, ball joints and pipe plugs. All the latest in equipment for producing . . .

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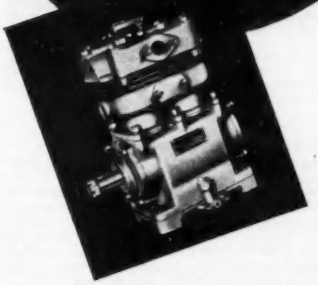

THE BENDIX-WESTINGHOUSE COMPRESSOR—heart of the air brake system—performance proven over more miles on more installations than any other compressor available!

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Why not take a tip for your brake specifications from the men who operate the rugged off-the-road giants. They'll tell you it takes **stopping power and performance-plus** to provide perfect braking control for nearly 70 tons of solid rock and steel, defying gravity up grade and down under the very toughest of operating conditions. Ask them what brakes they choose for this tremendous task and time after time you'll get the same answer—Bendix-Westinghouse. That's because these mighty brakes, built by the industry's most experienced manufacturer, pay off with the **safest, surest, most dependable braking action** and longest service life in the business. And these are factors that mean **reliable, economical performance** on any trucking or transit job—from the roughest to the most routine. That's why, no matter what type trucks or buses you manufacture, you'll give your customers the most in **safety, as well as savings** by specifying Bendix-Westinghouse—the world's most tried and trusted air brakes.

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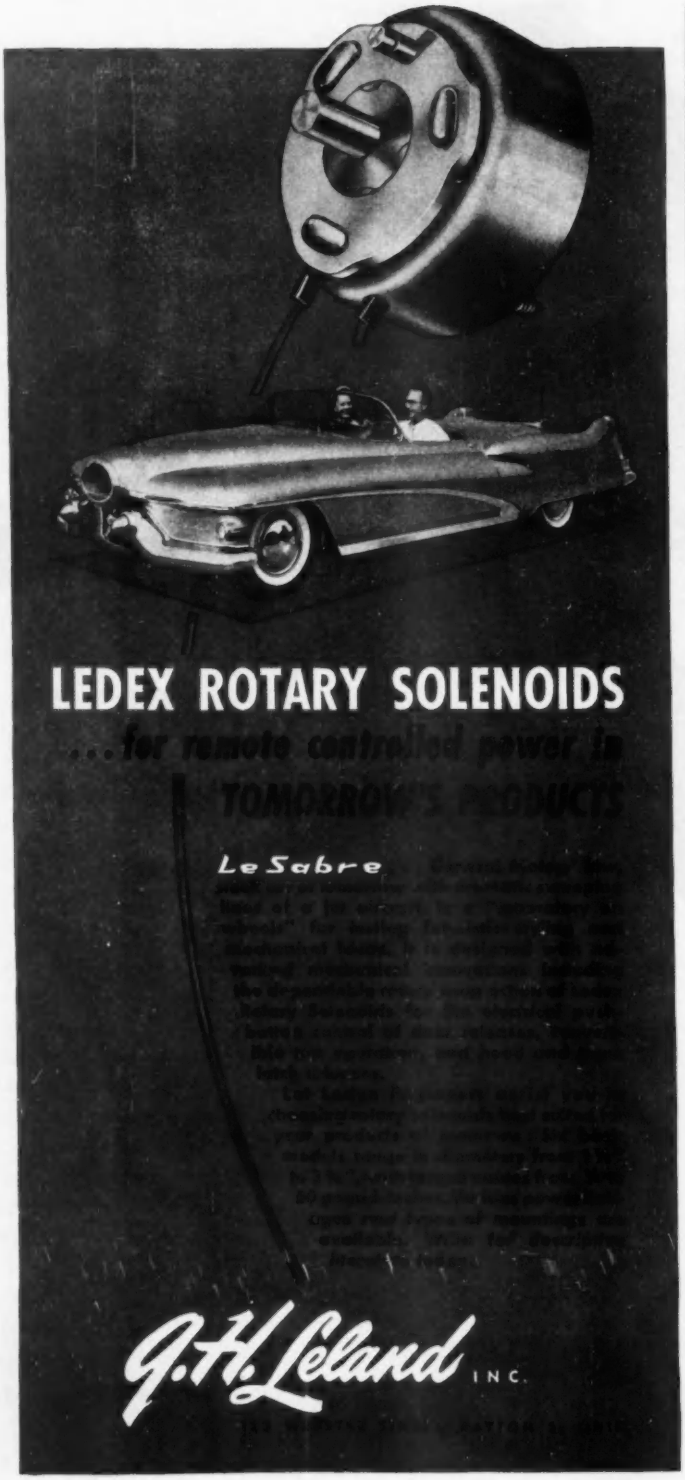

sleeve or wire wrap may be used when joining this combination to provide an excess of aluminum in the weld bead.

Aluminum has also been welded experimentally to the following metals: brass, nichrome, chromel, alumel, tungsten, steel, iron and constantan.

This article is based on a paper presented by the authors at a recent AIEE Welding Conference in Detroit.

BOOKS . . .

PRACTICAL METALLURGY FOR ENGINEERS, Revised Edition, 1952, *published by E. F. Houghton & Co.* Engineers and metallurgists alike will welcome the fifth edition of this practical reference book which has been in circulation since the printing of the first edition in 1923. The current edition has been thoroughly revised to encompass the latest standards and practices, includes a survey of the probable future course of new metals and alloys and methods of heat treatment. Although the book follows substantially the same pattern as the previous edition, it contains a considerable volume of new material and has been largely expanded by the addition of well over 100 pages of text and illustrations.

THE WELDING OF NON-FERROUS METALS *by E. G. West. Published by John Wiley & Sons.* A comprehensive technical analysis of the weldability and welding of non-ferrous metals and alloys, prepared during the last war and revised more recently, this text should be of great interest to everyone concerned with this phase of fabrication. The book is so organized as to provide a general summary of commercial methods—fusion welding, resistance welding, and pressure welding, in the opening chapters. This is followed by chapters dealing specifically with the welding of—aluminum and its alloys; magnesium; copper and its alloys; nickel and its alloys; lead and lead alloys; zinc and zinc alloys; low melting point metals; high melting point metals; precious metals. It presents the subject in a thorough manner, documented with specific references to the literature.

CONTROLLERS FOR ELECTRIC MOTORS, *by H. D. James and L. E. Markle, published by McGraw-Hill Book Co., New York, N. Y.* Price $7.00 A new second-edition retains all the practical and useful information about the design, application, operation, and maintenance of industrial controllers that was in the first edition. In addition, it includes chapters on such recent developments as the magnetic amplifier, the dynamo electric amplifier, magnetic clutches, a-c and d-c crane control, and remote and supervisory control.

Engineers whose job it is to select controls for machines and tools, and maintenance men whose job it is to keep these machines and tools running will find this book especially helpful. Since the text matter is a practical interpretation of electrical engineering theory, the engineering student will find the book very useful when applying the theory he has studied to practical workaday control systems.

There is much new material—some of it published for the first time—for example, the chapter on the magnetic amplifier. A lot of the text has been completely rewritten and brought up-to-date.

Another new development using

B. F. Goodrich Chemical *raw materials*

This seal designed and manufactured by Brummer Manufacturing Corp., Chicago Heights, Illinois. B. F. Goodrich Chemical Co. supplies Hycar rubber only.

Two-piece seal for crankshafts stops bearing leaks for good!

PREVENTING oil leaks from rear main bearings of automobile engines was always a tough problem—until an ingenious manufacturer developed this two-piece seal made with Hycar OR (oil resistant) rubber. It not only replaces rope or wicking seals, but also uses a new technique in shaft sealing.

It is made in two pieces. The oil-resistant Hycar rubber is molded into a lip-type seal on a half-circle, U-channel metal band. Two of these half-seals are fitted around the crankshaft and tightened together. Finely ground, the ends of each half-seal form a perfect, tight circle. Result—a positive oil seal . . . and an easy, simple installation method.

Because of Hycar OR's many advantages, it meets the severe service requirements of automotive engines. Hycar withstands high temperatures and abrasion . . . has exceptional resistance to automotive engine oils and greases with added detergents, and engine acids.

Versatile Hycar rubber compounds are used in many applications throughout industry. They can be made to resist heat and cold, weather, abrasion, oil, grease and many chemicals. Perhaps a Hycar rubber compound may help you improve or develop more saleable products—solve a problem you thought couldn't be answered. For helpful technical advice, please write Dept. HG-9, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

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CALENDAR

OF COMING SHOWS AND MEETINGS

Association of National Advertisers, Hotel Plaza, New York, N. Y. Sept. 22-Oct. 1

16th Commercial Show, Earls Court, London, England .....Sept. 26-Oct. 4

SAE National Aeronautic Meeting, Los Angeles, Calif. .....Oct. 1-4

Paris Automobile Show, Paris, France .....Oct. 2-12

Annual Meeting of Controllers Institute, Sheraton-Cadillac Hotel, Detroit, Mich. .....Oct. 5-8

Society of Industrial Packaging and Materials Handling Engineers, 7th Annual Exposition, Chicago, Ill. ..... Oct. 13-16

National Safety Congress, Chicago, Ill. .....Oct. 20-24

National Metal Show, Convention Hall, Phila., Pa. .....Oct. 20-24

37th International Motor Exposition, London, England .... Oct. 22-Nov. 1

SAE Transportation Meeting, Pittsburgh, Pa. .....Oct. 22-24

American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. .....Oct. 26-29

Transport Aircraft Hydraulic Conference, Park-Sheraton Hotel, Detroit, Mich. .....Oct. 28-29

SAE National Diesel Engine Meeting, St. Louis, Mo. .....Oct. 30-31

Montreal Tool and Equipment Show, Show Mart Building, Montreal, Canada .....Nov. 11-14

16th Annual Time and Motion Study and Management Clinic, Industrial Management Society, Sheraton Hotel, Chicago, Ill. Nov. 5-7

SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 6-7

Third Annual International Motorama, Los Angeles, Calif..Nov. 7-16

API 32nd Annual Meeting, Conrad Hilton Hotel, Chicago, Ill..Nov. 10-13

American Institute of Electrical Engineers Conference on Recording and Controlling Instruments, Benj. Franklin Hotel, Phila., Pa. .....Nov. 17-18

7th Midwest Conference, American Society for Quality Control, Claypool Hotel, Indianapolis, Ind. .....Nov. 20-21

Society for Experimental Stress Analysis, Annual Meeting and Exhibition, Hotel McAlpin, New York, N. Y. .....Dec. 3-5

National Standard Parts Association Congress, Ambassador Hotel, Atlantic City, N. J.....Dec. 8-9

Automotive Service Industries Show, Atlantic City, N. J.....Dec. 10-13

1953

SAE Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Jan. 12-16

Plant Maintenance Show, Public Auditorium, Cleveland, Ohio. Jan. 19-22

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y....Feb. 24-27

American Society for Testing Materials, Spring Meeting, Detroit, Mich. .....Mar. 2-6

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. ...Mar. 16-20

German Vehicle Show, Frankfort, Germany .....Mar. 19-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, Los Angeles, Calif.....Mar. 23-27

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

NEW! MITCHELL IGNITION SWITCH

Cutaway view of new Mitchell ignition switch showing die cast detent path and operating mechanism.

with Superior Detent Action

United Specialties' Mitchell Division, pioneer of the starter-type ignition switch combining starter circuit and ignition switch functions, now offers a new, improved starter-ignition switch. Check these advantages:

1. **Positive, smooth, far superior detent action.**
2. **Extra long life.**
3. **Simplicity of design — only a minimum of parts.**
4. **High electrical capacity — a "must" with today's accessory-loaded cars.**
5. **Built to withstand the effects of dust and moisture.**

Your inquiries about this new ignition switch or about Mitchell's turn signal switches and complete line of rolled shapes will receive prompt attention.

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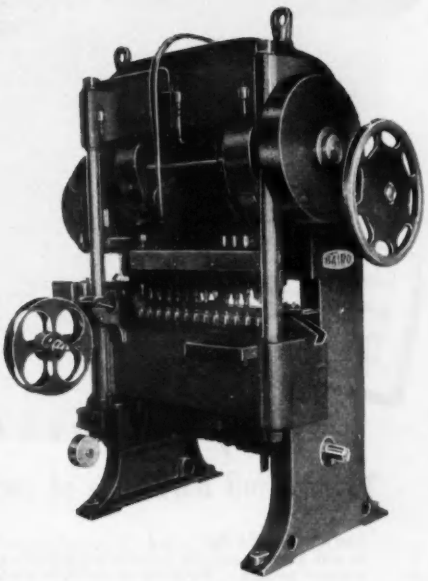
ASK BAIRD ABOUT IT!

Is low-cost volume production of SMALL PARTS one of your problems?



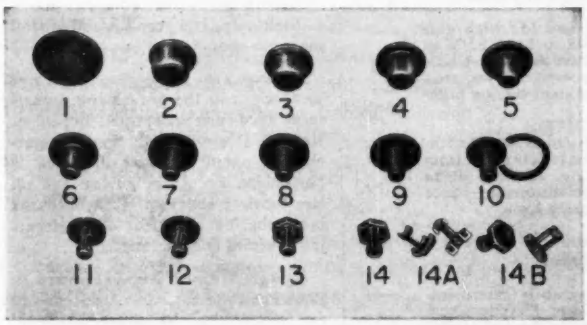
Then let us tool the job for you on a

BAIRD MULTIPLE TRANSFER PRESS...

and you can just about push the "start" button and forget it. Coiled stock is automatically fed to the press, moving quickly from station to station for blanking, drawing, piercing, embossing, slitting, trimming, broaching, sizing, hexing, forming, etc.

Here, for example, is a typical job (photograph shows work as performed in a 14-station die set).

HEX LOCK NUT COMPLETED IN ONE OPERATION



It starts with the round blank No. 1 and continues through the drawing operation to station No. 9. At station No. 10 the flange is trimmed to size for Hexing. Station No. 11 — the two sides are pierced. No. 12 is sizing. No. 13 — the Hexing is done. No. 14 — the end hole is pierced and the piece is completed. Figure "A" is a piece cut in two to show the section. "B" are completed pieces. The production is 70 pieces per minute.

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HEAVIER cuts

to closer tolerances and finer finishes

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To take full advantage of carbide tools . . .

You need a lathe that's rigid. Carbo-Lathe's bed and tailstock are cast in one piece from 500 pounds of chrome-molybdenum iron. The massive quill is 3" in diameter. Heavy bed sidewalls are reinforced with thick cross ribs. Lipe Carbo-Lathe stands rigid as a rock!

You need high speeds. There are 162 low-gear and 153 high gear speed changes on a Lipe Carbo-Lathe—from 95 to 1130 RPM in low gear, and 167 to 1978 RPM in high gear. Take the high spindle speeds, combine them with rigidity and brute power, and you get a lathe that permits fast, heavy hogging or intermittent cuts on high-Brinell and tough steels.

You need precision cutting. Lipe Carbo-Lathe is tested to .0005" accuracy, without out-of-round or taper on an 18" piece. Cuts range from .003" to .030". Finish resembles rough grinding, generally 80 to 100 micro-inches. The chatter-free drive prevents distortion—hence tool breakage and part spoilage are held to amazing lows.

Rigidity — Speed — Precision
You Get All 3 with a Lipe Carbo-Lathe!

And in addition . . . complete cycle can be electrically controlled. Lipe Carbo-Lathes are available with Automatic Electric Cycle Attachment (shown above). Operator merely loads the lathe, then presses a button. Attachment sold separately—may be put on any Lipe Carbo-Lathe bearing a serial number of 200 or greater.

• Write for full information and delivery dates •

Lipe-ROLLWAY CORPORATION
Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

MEN *in the* NEWS

(*Continued from page* 25)

Pittsburgh Steel Co. — **Allison R. Maxwell, Jr.,** has been elected vice president-sales and **Marvin J. Bair** general manager of sales.

Wagner Electric Corp.—**A. Callaway Allen** was recently named sales manager of the electrical division.

Minneapolis - Honeywell Regulator Co., Industrial Div.—The appointment of **C. L. Peterson** as general sales manager was recently announced.

Campbell, Wyant & Cannon Foundry Co.—**Horace A. Deane** has been elected a vice president of the company.

General Motors Corp., Cadillac Motor Car Div.—**M. E. Fields** has been appointed merchandising manager. He will head the sales division's merchandising, advertising and sales promotion activities. **W. S. Chisholm** succeeds him as director of personnel and public relations.

American Brake Shoe Co., Brake Shoe and Castings Div.—**Thomas J. Wood** has been named operating assistant to the president and **Raymond A. Frick** has been made general works manager. **Thomas W. Russell, Jr.,** is now general purchasing agent.

Ryan Aeronautical Co.—**C. A. Stillwagen** has been made treasurer in addition to his post as secretary of the company.

Aluminum Co. of America—**Harry L. Smith, Jr.,** has been appointed staff manager—product sales.

General Tire & Rubber Co.—Three promotions in the purchasing department have been announced: **Donald A. Kepler** is promoted to general purchasing agent; **Chester J. Zabik** is purchasing agent for rubber and all tire fabrics; and **Emil F. Schnedarek** is purchasing agent for all engineering projects and services.

Stewart-Warner Corp.—**Leonard L. Robb** has been named to head sales to car factories and other original equipment users.

Ford Motor Co., Special Product Operations Dept. — Appointment of **Harley F. Copp** as chief product engineer has been announced.

Timkin Roller Bearing Co.—**John A. Riley** was recently elected secretary and treasurer.

(*Turn to page* 114, *please*)

To the Executive Planning for TOMORROW...

This all-aluminum dump truck body weighs only 2345 pounds. The same "20-ton" body in steel weighed 4800 pounds. Thus aluminum offers a direct weight saving of more than 50% ... and most important, this saving in gross weight is translated directly into an amazing *2455 pounds of added payload!*

Aluminum helps carry these bigger loads longer and at lower cost, too, because the aluminum bodies will never rust or corrode from exposure to the weather. With rust eliminated, the user of an aluminum body is assured of longer equipment life. He is also assured of lower maintenance costs because aluminum requires no painting or repainting.

Reynolds Aluminum Specialists worked closely with the Marion Metal Products Company of Marion, Ohio, in producing these all-aluminum, all-welded dump bodies for tractor-trailer trucking. If you would like the assistance of Reynolds Aluminum Specialists in adding sales appeal and reducing costs of your products, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or write direct to Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.

REYNOLDS METALS

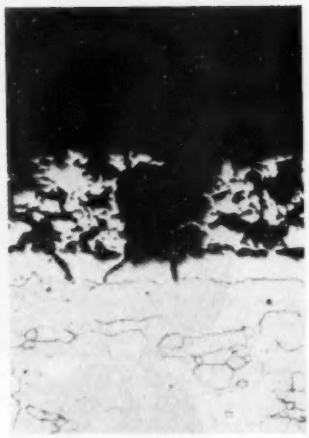
REYNOLDS ALUMINUM

Coatings Protect Molybdenum at High Temperatures

BECAUSE of its high melting point (4750F), molybdenum offers possibilities for use in aircraft jet engines. If molybdenum is to be used at jet-engine temperatures, however, it must be protected from rapid oxidation.

The National Bureau of Standards has recently conducted a study of protective coatings for molybdenum composed of chromium and frit (glass). Results indicate that such coatings greatly extend the useful life of molybdenum at high temperatures, giving better protection than either chromium or ceramic coatings alone. Various chromium-frit coatings were bonded to molybdenum specimens, then subjected to oxidation tests under tension in the range 1500 to 1800 F, and to flame tests in the range 2000 to 3000 F. At temperatures of 1500 to 1800 F the coated specimens lasted for 1000 to 3000 hours. At 2800 F, with no applied load, protection for as much as seven hours was attained, enough to be valuable for some applications.

The present NBS study is one phase of a continuing program for development of ceramic protective coatings for metals and alloys. In this new



Photomicrograph of molybdenum specimen coated with glass seal-coat M-13 on top of chromium-frit coating M-39. The specimen was subjected to thermal shock for 25 cycles from 1800F prior to sectioning. The glass seal-coat apparently tended to seal thermal-shock cracks that developed in the base coat. Top (dark gray) layer: plastic mount. Second (narrow black) layer: glass seal-coat. Third (variegated grey-and-white) layer: chromium-frit coating. Fourth (narrow white) layer: diffusion layer. Bottom (near-white) layer: molybdenum. (X150, etched in nitric acid).

study, molybdenum specimens were first coated with one of several powdered chromium-bearing base coats, which in some cases also contained some frit. After firing of the base coat, in either a hydrogen or an argon atmosphere, a ceramic seal-coat containing no chromium was applied to some of the specimens. Test results indicate that the most durable coatings resulted from application of a glass-free chromium base coat, followed by a glass seal coat. Addition of a third coat, consisting of lower-melting glass, resulted in a coating

(*Turn to page* 110, *please*)

THE RIGHT **BALL**

Let Strom Help You

Not only in precision ball bearings, but in countless other places, Strom has found that the right ball will do the job better. Maybe your problem can be solved with the use of the proper ball. Why not take it up with Strom.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

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THESE NEW FACTS
about G-E Silicone Rubber?

EVER use silicone rubber in the design of parts or equipment?

If you have, you'll be interested in some new facts regarding this remarkable material. And if you haven't used or specified silicone rubber before, these new discoveries may suggest how you could take advantage of its unusual properties in *your* business.

COSTS GREATLY REDUCED

New types of silicone rubber, developed by General Electric, are THREE TIMES AS STRONG as early varieties. Yet this new rubber actually costs *much less.* Its amazing heat- and cold-resistant properties have made it ideal for applications where *no other* rubber could meet specifications.

WHERE CAN YOU USE IT?

If you haven't investigated G-E silicone rubber *lately,* you'll want to get the facts about these important new developments. A booklet describing some of the uses and outlining the characteristics of this amazing material has just been printed. We'll be glad to send you a copy, free. Just use the coupon.

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Photos Courtesy The Massey-Harris Company.

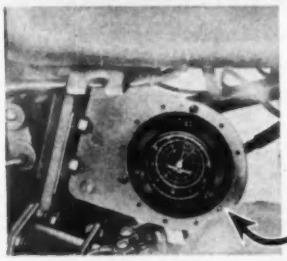
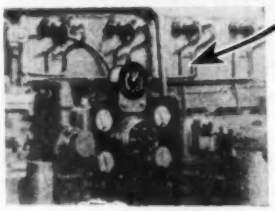


Photo Below Courtesy Cummins Engine Company, Inc.



The Sure Way to "Design out" Vibration and Shock Damage.

Lord Meter Mountings are paying dividends to manufacturers and users of heavy duty industrial and farm tractors, lift trucks, stationary engines and many other industrial machines where shock and vibration are encountered.

The Lord Meter Mount assures the accurate performance designed into Hobbs Engine-Hour Meters when they are subjected to excessive vibration on farm tractors and stationary diesel engines. These meters are protected from the damaging effects of vibration and shock by the unique method of combining shear and rolling action of the rubber to absorb destructive forces. The outer ring is mounted to the panel and the inner ring holds the meter thus giving protection in multi-planes. The rubber between these rings does the work. We will be pleased to have the opportunity to help you in the application of Lord Meter Mountings.

SAE National Aeronautic Meeting Hotel Statler, Booth No. 26 Los Angeles, California October 1-4, 1952

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HEADQUARTERS FOR VIBRATION CONTROL

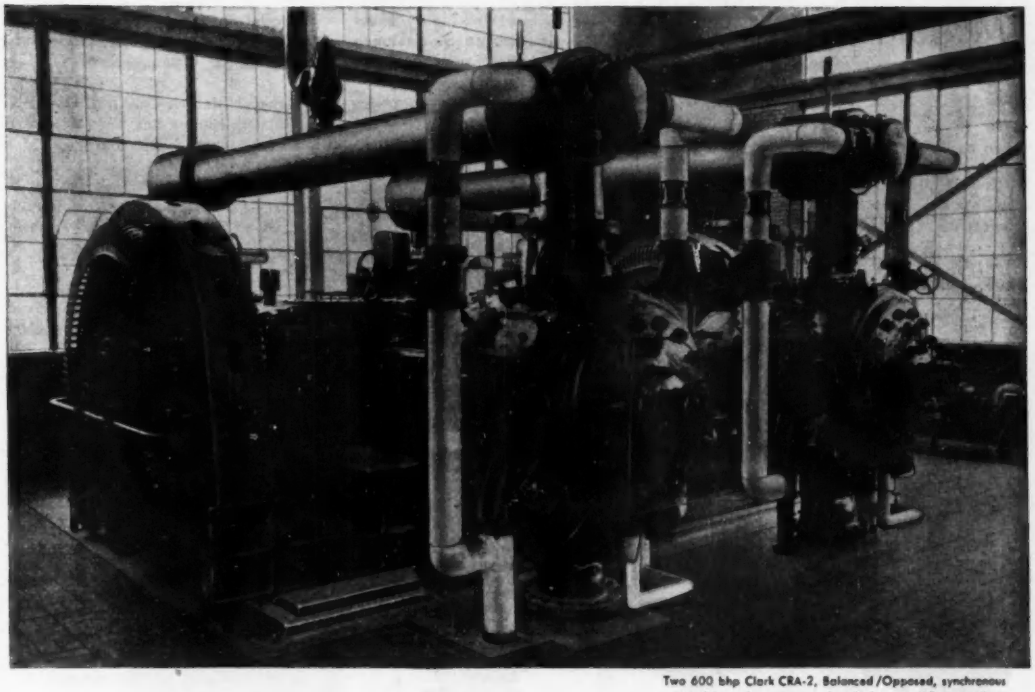
showing the highest durability of all those investigated.

Microscopic examination of sections shows that the chromium of the base coat has a somewhat porous structure, formed by the diffusion-welding of the chromium particles to each other and to the molybdenum base. The glass is subsequently absorbed into this structure during the firing of the seal coat. Although thermal strain and rapid creep tend to cause cracking of the coatings, adherence is excellent and the glassy layer tends to reseal the fissures, so that cracking does not result in rapid failure.

BOOKS . . .

D-C POWER SYSTEMS FOR AIRCRAFT, *by Kaufman and Finison, published by John Wiley & Sons.* This book is based upon work which had its beginnings in WW II and its approach is unique in evaluating power systems not on the characteristics or behavior of a single element but on how the individual components work together to make up a complex system. Essentially, it covers the system-engineering work carried out at Wright Field and at the General Electric Co. These studies were conducted on the basis of paper analysis rather than complete flight tests, flight tests being employed only to verify analytical approaches. Within the framework of this philosophy of system-engineering, the authors have provided a complete analysis of the power system, some of the chapter headings being given here: aircraft generators, generator controls, source systems; auxiliary power plants, electric-system analysis, effects of short circuits, application of system protection. Much of the material has been drawn directly from the General Electric Review Series.

PLASTICS MOLDING, *by John Delmonte, published by John Wiley & Sons.* Here is a timely text in the rapidly expanding plastics field of vital importance in the automotive industries. Since the conversion of organic plastics into useful products depends to a large extent upon an understanding of molding processes and equipment, the author offers a carefully planned analysis of the equipment and accessories that permit the maximum of versatility and commercial success. The subject is approached from an engineering standpoint, touches on the flow of materials, and the handling of different materials in the process. The text emphasizes the application of scientific principles, provides a mathematical analysis of each phase of the subject at the proper point. The subject is divided into 18 chapter headings, starting with an introduction to plastics molding materials and their properties, and concluding with a description of modern plant layout. Although considerable and adequate space is given to molding equipment, much of the discussion centers about accessories such as—pumps, valves, pressure systems, instrumentation, injection molds and their design, material preparatory equipment. In addition, attention is given to such technical matters as—distribution of gases and fluids, heat for molding, finishing accessories, and extrusion equipment.



Two 600 bhp Clark CRA-2, Balanced/Opposed, synchronous motor-driven air compressors installed on steel framework on second floor of a Michigan auto body stamping plant.

vibration free...

these compressors can operate alongside even the most delicate of equipment

Perfect balance permitted a widely known Michigan auto body stamping plant to mount these two Clark Balanced/Opposed, Motor-Driven Air Compressors on the second floor, near production machines. Long pipe runs, with their attendant pressure drops, were thereby eliminated.

The fact that all vibration has been eliminated from the Clark Balanced/Opposed design permits installation anywhere. *There just isn't any vibration to be transmitted to nearby equipment!* This is especially important in plants having delicate machines and precision operations which cannot tolerate vibration.

Furthermore, with the unusual compactness of the Clark Balanced/Opposed design, it is feasible to install two units side-by-side (as illustrated), enabling greatest possible operating flexibility in meeting the varying air requirements of different plant shifts.

For information on the complete Clark Balanced/Opposed Compressor line, covering 150-4500 bhp, request Bulletin 118.

CLARK BROS. CO. · OLEAN, N. Y.
Division of Dresser Operations, Inc.
SALES OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

CLARK
balanced/opposed
COMPRESSORS

MEN *in the* NEWS

(*Continued from page* 106)

B. F. Goodrich Co., Replacement Tire Div.—**Thomas C. Yarnell** has been named central division manager.

General Motors Corp., Aeroproducts Div.—**D. D. Bowe** was appointed assistant general sales manager.

Snyder Tool & Engineering Co.—**R. T. Johnstone** is now chief draftsman.

Pittsburgh Plate Glass Co., Fiber Glass Div.—**Dr. George S. Bachman** has been named director of research for this new division.

Weber Aircraft Corp.—**Milton V. Nelson** was recently named chief sales engineer.

Bridgeport Brass Co.—**Chester M. Adams** was promoted recently to general sales manager.

Warner Electric Brake & Clutch Co.—**M. C. Peterson** has been named manager of national account sales.

Chrysler Corp., Fargo Motor Corp. Div.—**William C. Hanway, Jr.,** was recently named vice president.

General Motors Corp., Allison Div.—**Paul W. Rhame** has been appointed assistant general manager.

Fairbanks, Morse & Co.—**Orren S. Leslie** was named manager of manufacturing. **R. H. Morse, III,** succeeds him as general manager of the Beloit, Wis., plant.

Ford Motor Co.—**William Clay Ford** has been appointed manager of special products operations, a new component.

Solar Aircraft Co.—**Rear Adm. Wilder D. Baker** has joined the firm as consultant to the president.

S. Shamban & Co.—**Henry A. Taub** has been named chief engineer and **Frank R. Chaffin** research director.

General Motors Corp., Rochester Products Div.—**Howard W. Brandt** was recently named general manager.

Gar Wood Industries, Inc., Richmond Div.—**F. Eugene Englander** was appointed sales manager recently.

Champion Spark Plug Co.—**E. F. R. Horner** has been named to the newly created post of sales promotion manager.

P. R. Mallory & Co.—**Dr. C. J. Breitwiesser** was recently promoted to director of engineering.

Kaiser-Fraser Corp., Aircraft Div.—**H. R. Smith** is now operations manager and **B. M. Laney** is works manager.

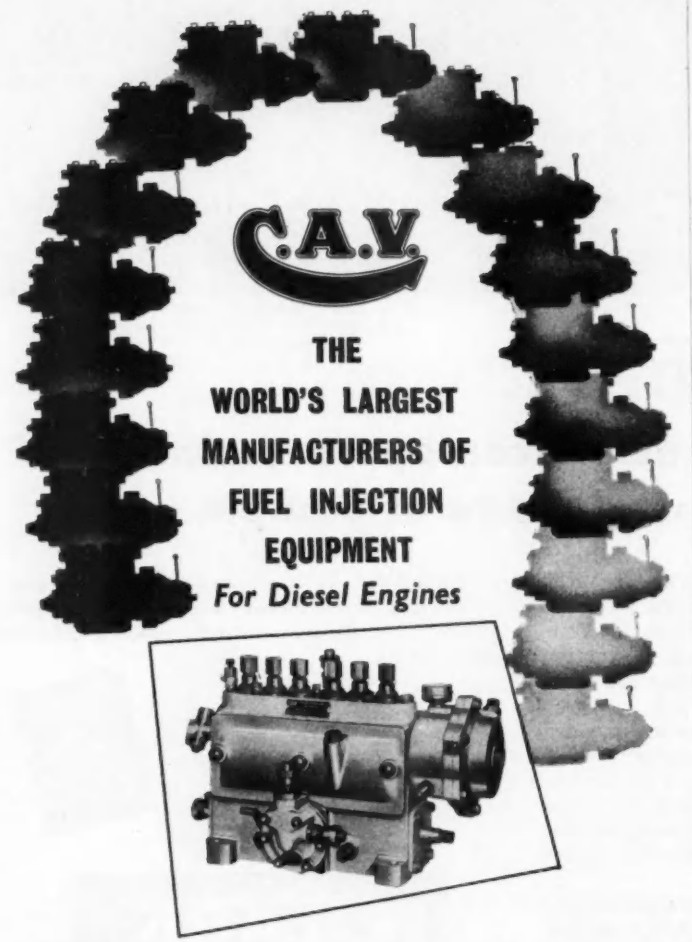
Ethyl Corp.—**Matthew A. Taylor** has been named manager of sales operations.

Illinois Tool Works—**Harvey O. Edson** was recently named controller.

Cutler-Hammer, Inc.—**H. B. Phillips** is now sales manager of the quantity sales division; **F. A. Wright** is sales manager of district sales, and **J. M. Cook** is sales manager of the industrial control divisions.

Wooster Rubber Co.—**J. K. Buckwalter** has become general sales manager.

National Carbon Co.—**F. W. Berdan** has been appointed manager of automotive products sales, and **J. F. Warnell** was appointed manager of battery products sales.



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Fuel Injection and Electrical Equipment

Depots and Service Agents in over 100 countries

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., 653, TENTH AVENUE, NEW YORK 19, N.Y.
Sales Office: 14630 DETROIT AVENUE, CLEVELAND 7, OHIO

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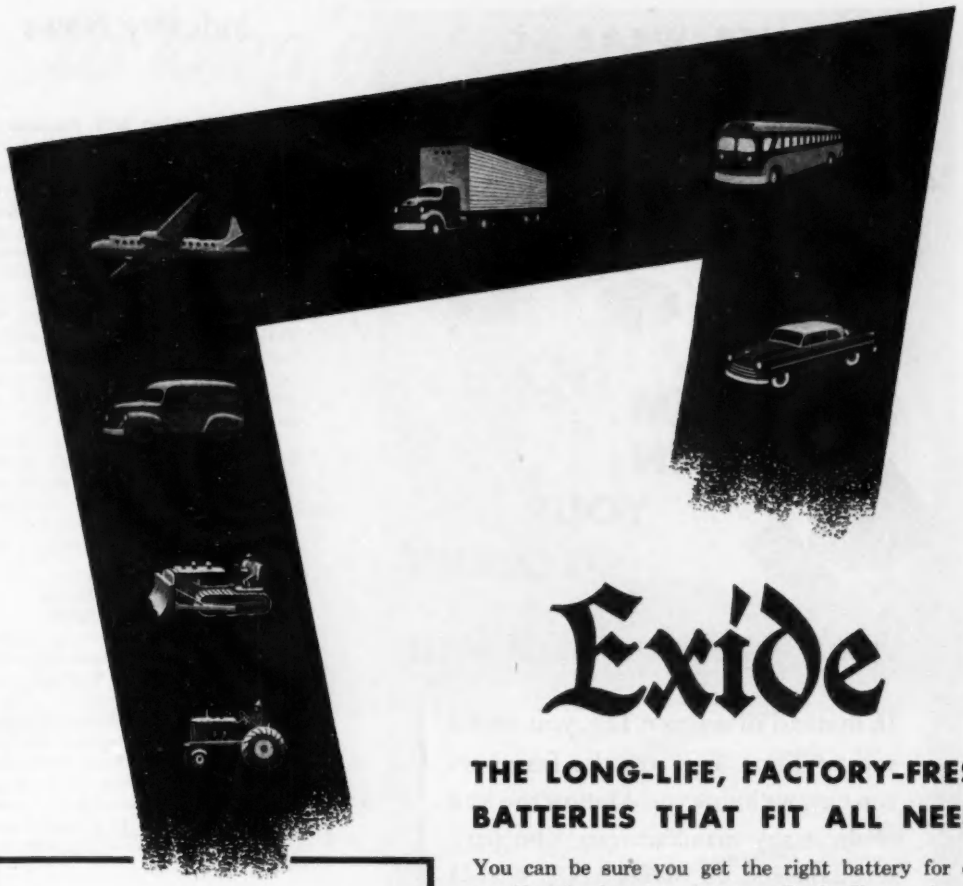


Exide

THE LONG-LIFE, FACTORY-FRESH BATTERIES THAT FIT ALL NEEDS

You can be sure you get the right battery for each specific job when you choose an Exide. Types, sizes and capacities are provided for every kind of automotive equipment—gas or diesel powered. There are Exide batteries for automobiles, trucks, tractors, buses, off-the-highway equipment, aircraft, motorboats.

Each Exide battery is a product of years of research-engineering that keeps pace with current automotive developments and anticipates future needs. Each is built to give you dependable performance, long battery life, low cost per mile of operation. Prompt deliveries of factory-fresh batteries are assured by the many Exide manufacturing and assembly plants.

Exide engineers will be glad to work with you on any of your storage battery problems.

STARTING POWER

for light, medium or heavy-duty service

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

"Exide" *Reg. Trade-mark U.S. Pat. Off.*

1888... DEPENDABLE BATTERIES FOR 64 YEARS... 1952

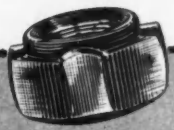
IF NUTS WERE SOLD
ON THE BASIS OF *the* TIME
REQUIRED TO USE THEM IN YOUR PRODUCT

...you'd buy Midland Weld Nuts!

If, instead of a Price Tag, you could see a "Time Tag" on the fasteners you buy, we know you'd follow the lead of the many manufacturers who have standardized on MIDLAND WELD NUTS for those hard-to-get-at places.

Find out more about...

MIDLAND



WELD NUT

The MIDLAND STEEL PRODUCTS COMPANY
6660 Mt. Elliott Ave. • Detroit 11, Michigan
Export Department: 39 Pearl St., New York, N. Y.

MANUFACTURERS OF:

AUTOMOBILE AND TRUCK FRAMES
AIR AND VACUUM POWER BRAKES
AIR & ELECTRO-PNEUMATIC DOOR CONTROLS

Industry News

(*Continued from page* 24)

Large Rolling Mill Planned for Alcoa Ia. Operation

A new rolling mill, costing approximately $4.5 million and capable of producing extra-wide tapered sheet and plate for aircraft, will be installed at Aluminum Co. of America's Davenport, Ia., works by late 1953.

Equipment for the mill will be designed, installed, and operated by Alcoa under terms of a lease arrangement with the Air Force's Air Materiel Command. The latter, in turn, will have first call on production of the new mill.

The mill, capable of rolling widths up to 10 ft through four-high stands of rolls, will be able to handle hot or cold ingots, and it will be reversible. Tapered sheet on the new mill will be produced in lengths exceeding 33 ft.

Westinghouse Expands Works in South Phila.

A $32 million expansion program is under way at the South Philadelphia, Pa., Works of Westinghouse Electric Corp.

The project involves re-occupancy of the Navy-owned Merchant Marine plant adjoining the South Philadelphia Works, extensions to existing buildings, extensive purchases of new machine tools, and a $6 million steam and gas-turbine research and development laboratory.

French Automobile Output Increases

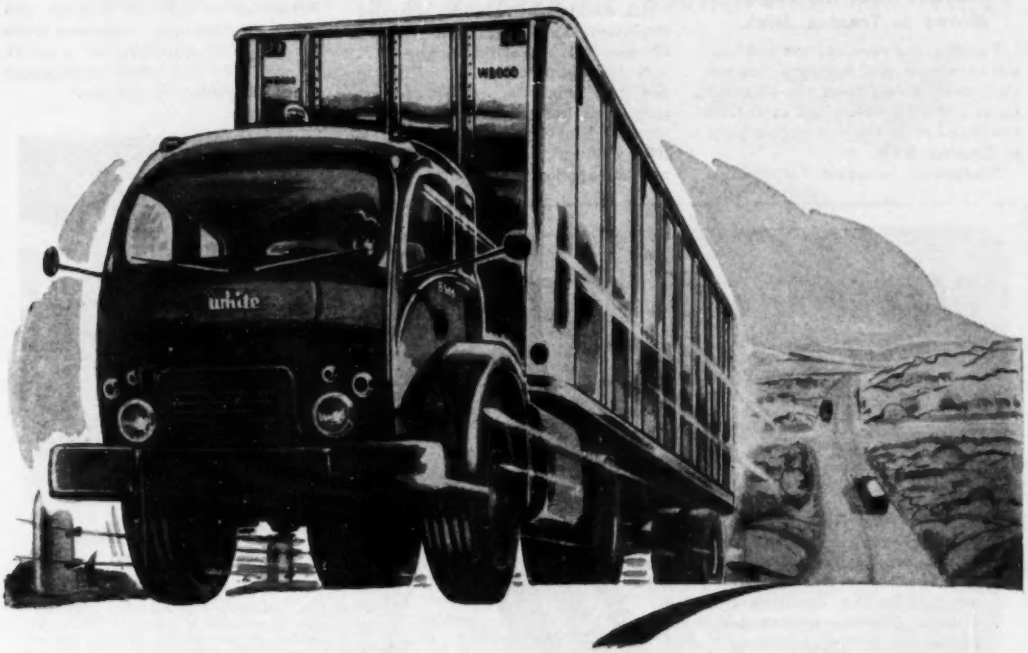
During the first five months of this year, French automobile production jumped more than 15 per cent over the corresponding period of 1951 to reach a total of 214,308. This comprised 155,629 passenger cars, 56,796 trucks, 1086 buses and coaches, 660 road tractors, and 139 special vehicles.

Honeywell Building Jet Controls Lab

A new jet engine controls laboratory is under construction by the Aeronautical Div. of Minneapolis-Honeywell Regulator Co. An analog computer, heart of the laboratory's electronic system, is said to simulate a wider range of experimental conditions than would flight testing. When completed this summer the laboratory will have a capacity of 50,000 lb of fuel flow per hour for testing jet engine controls.

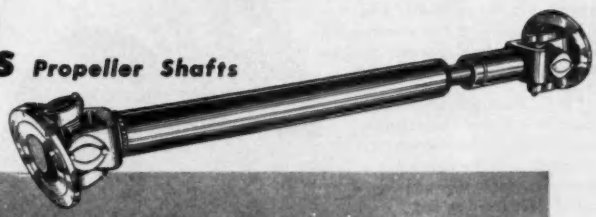
(*Turn to page* 116, *please*)

to keep 'em rolling ...



you can count on

BLOOD BROTHERS *Propeller Shafts*



Shippers demand *fast* freight delivery — and that calls for drive line assemblies that stand up . . . no matter how long or tough the haul.

Blood Brothers Universal Joints and Propeller Shafts are built for just such performance! Like the users and builders of White Motor Trucks, you'll find them a superior combination of rugged design, top-grade material and excellent workmanship.

Why not take full advantage of Blood Brothers 42 years' concentration in this one field by giving your engineers — and ours — an opportunity to work together in the early stages of design?

BLOOD BROTHERS machine co. ALLEGAN, MICHIGAN

UNIVERSAL JOINTS AND DRIVE LINE ASSEMBLIES

Division of Standard Steel Spring Company • Chicago Office: 122 S. Michigan

Industry News

(*Continued from page* 114)

Chrysler Industrial Engine Moved to Trenton, Mich.

Facilities for manufacture and testing of marine and industrial engines have been moved from the Chrysler Corp. Jefferson Ave. plant in Detroit and installed in the new engine plant at Trenton, Mich.

Equipment including 394 production machines, engine assembly conveyors and plant engineering equipment was moved to the Trenton plant without loss of employment or production, according to the announcement.

All administrative and production employees and operations of the Marine and Industrial Engine Div. have been transferred to the Trenton site. An enlarged product development department will be devoted to the design of modifications of industrial engines to provide power for unusual applications.

HARDENED & GROUND PARTS
to exact specification

This spring pivot bolt typifies our machining versatility and strict adherence to specifications. Bolt is made from 1⅞" high-carbon alloy steel hex bar stock; overall length, 5⅞". Threads are precision cut, concentric with body diameter. After heat treating, threads are re-threaded to the specified pitch diameter. Bearing surface is ground to a fine micro-finish, ± .001 tolerance. The very latest equipment is used to make the knurling clean and sharp.

Brown Hardened and Ground Parts have served the automotive industry for over 40 years. Our specialty is precision machining, scientifically - controlled heat treating and micro - finish grinding. How can we serve you? Write or wire . . .

Experienced production on:
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
... anything in the hardened and ground line, of any analysis steel, up to 4" ø

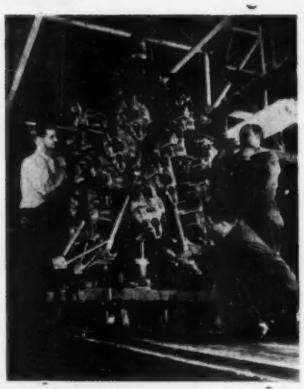
Henry W. Brown
PRESIDENT

THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.

C. H. Eklert, 2487 Crawden Rd., Cleveland • N. F. Spring, 4715 Bellmar Rd., Detroit • R. C. Sanderson, 5959 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Johnson Williams & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hurst, 5511 S.E. Yamhill St., Portland, Ore.

Olds Near Completion of Jet Parts Plant

Oldsmobile is installing the first machinery in its nearly completed jet engine parts plant at Lansing, Mich. Production is expected to start this fall on turbine and compressor units for the J-65 Sapphire jet aircraft engine.. The new plant encompasses about 700,000 sq ft of space.



AIRCRAFT ENGINE OVERHAUL

Workmen at the Chicago Aircraft Div. of Ford Motor Co. prepare to tear down an engine after a five-hour "green" test run. Each part will be examined, and the engine will be reassembled and retested before delivery to the Air Force.

Bohn Aluminum Signs With Export Firm

All export activities of the Automotive Replacement Products Div. of the Bohn Aluminum and Brass Corp., Detroit, Mich., are to be handled by Borg-Warner International Corp., according to a recent joint announcement.

The export firm is said to have virtually completed its postwar program of establishing warehousing distribution outlets for automotive replacement parts throughout the world.

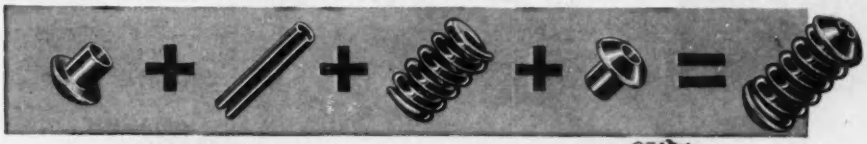
Ordnance Cancels Order Personnel Carriers

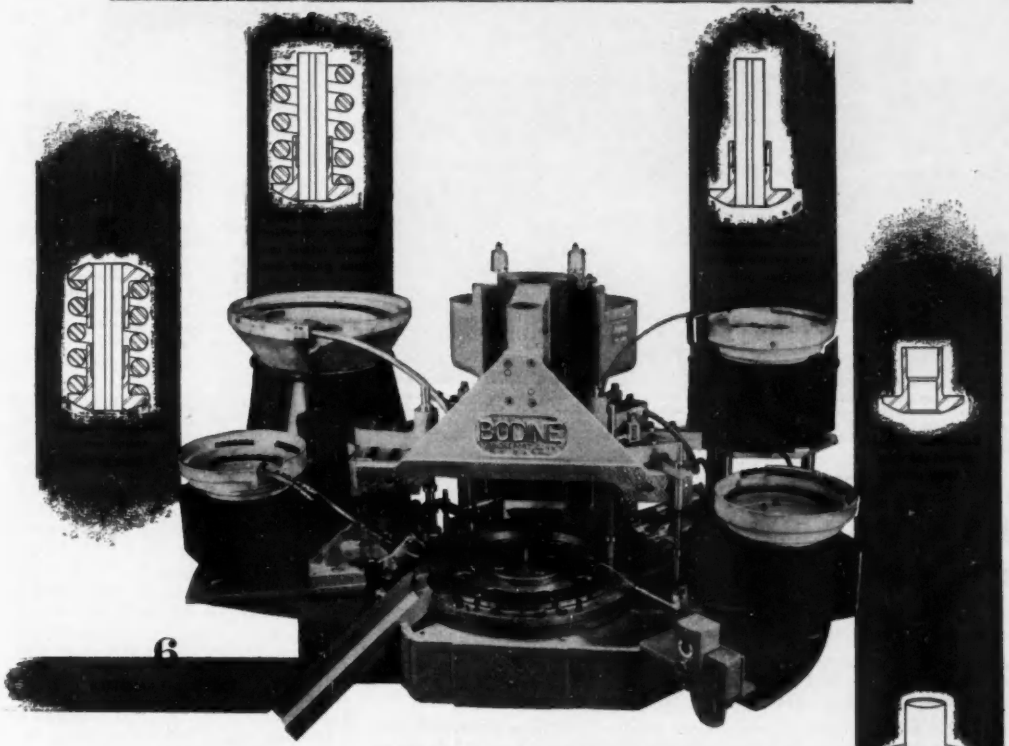
The Ordnance Corps has cancelled a $64 million production order for armed personnel carriers that had been awarded to Food Machinery and Chemical Corp.

Cancellation was attributed to pend-development of a newer design of vehicle similar to the personnel carriers originally ordered. The company still has about $84 million worth of defense work on its books.

Bodine CASE HISTORY NO. 33

Bodine ASSEMBLES A DAMPENING SPRING AUTOMATICALLY





Lower spring seat.

PRODUCTION: This high speed assembly job is automatically performed on a Bodine 42-30 dial type machine, equipped with four Syntron hopper feeds. It is specially tooled for assembly of a dampening spring for an automobile clutch plate.

All four components are hopper fed to position. Production is 40 assemblies per minute . . . automatically ejected.

Bodine engineers can solve your problems for repetitive production of small parts . . . milling, drilling, tapping or assembly, automatically . . . at low cost. Write us!

You Can't Meet Tomorrow's Competition

With Yesterday's Machine Tools

THE **Bodine** CORPORATION
BRIDGEPORT 5, CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

39D52

One of the most exacting machining operations in the production of turbo-jet engines is the grinding of compressor rotors in the Kansas City plant of the Aviation Gas Turbine Division of Westinghouse Electric Corporation. Two 24" x 96" Norton cylindrical grinders are mounted, as shown above, directly on Korfund Steel Spring Vibro-Isolators without the usual massive foundations. These grinders are 19' 6" long and weigh 27,200# each.

...by protecting grinder accuracy against external vibration

Extremely close tolerances required for compressor rotors made it necessary for Westinghouse to isolate their cylindrical grinders from heavy external truck vibration.

Conventional foundations would have required an excavation through the existing floor 7 ft. wide by 22 ft. long by 4½ ft. deep—with over 20 cubic yards of concrete weighing approximately 80,000 lbs.—for each grinder.

In contrast to this, Korfund Steel Spring Isolators permitted installation of the grinders directly on the existing concrete floor after simply removing the wood block to help reduce the height of the installation.

Tests made after the installation was completed—in which the isolators were "short circuited" out—demonstrated that it would have been impossible to do accurate work on the grinder without Korfund Vibration Control. Rigid alignment of work and grinding head is maintained, as proven by the fact that during the first two years of operation, no adjustments have been required.

Korfund Isolators more than paid for themselves in reduced foundation costs alone.

If you would like more information on how Korfund Vibration Control can save you money and increase production, write for your free copy of "Steel-Spring-Type Vibration Mountings for Machine Tools." Also, a selector chart in Bulletin G-104 gives recommendations for both normal and critical installations—for machine tools, presses, hammers, pumps, compressors and most other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

THE KORFUND COMPANY, INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

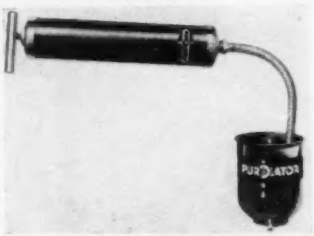
48-02 A Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 64)

Oil Filter Pump



Made of heavy gauge steel and treated to prevent corrosion, a filter pump has been developed with a flexible nozzle for cleaning out oil filter when the unit is opened for refill changing. After removing the dirty element, the pump removes dirty oil in one operation. (Purolator Products, Inc.)

Circle P-8 on page 65 for more data

Laminated Sheet Material

Recently introduced is a grade of laminated thermosetting sheet material called Dilecto GM-1. It is a fiberglas mat, melamine resin bonded product with high arc and flame resistance qualities.

Typical applications include: switch-board panels, subpanels, structural parts, arc barriers for switches and circuit breakers, and armature as well as field coil slot wedges and spacers.

It is presently available in 38 in. by 38 in. and 38 in. by 42 in. sheets in a thickness range from 1/16 to ½ in. *Continental-Diamond Fibre Co.*

Circle P-9 on page 65 for more data

Dual-Purpose Oil

An oil recently announced is produced in two grades and is said to function both as a lubricant and as a preservative. Special additives are incorporated to ensure maximum preservation of internal engine surfaces with motor oil additives of the type used in heavy-duty lubricants.

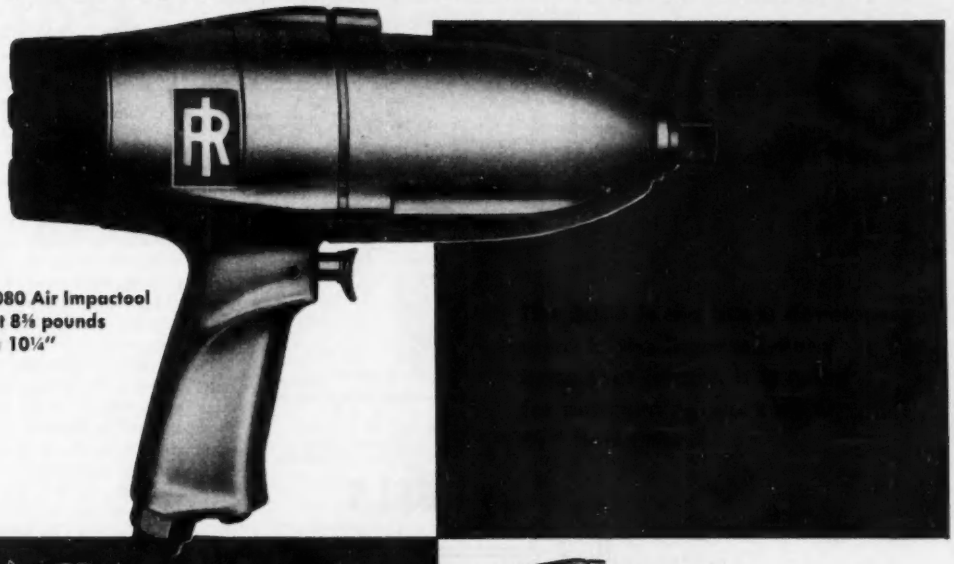
In addition to its application in the engines of vehicles scheduled for storage or shipment, the new lubricant-preservative has proved useful in other internal combustion engines in intermittent service. *Texas Co.*

Circle P-10 on page 65 for more data

(*Turn to page* 120, *please*)

SIZE 5080 IMPACTOOL CUTS RUNDOWN TIME 50%!

Use the Ingersoll-Rand Size 5080 Air Impactool for running nuts down fast...and drawing them up tight!



Size 5080 Air Impactool
Weight 8⅝ pounds
Length 10¼"

QUIET

Scientifically designed and job-tested muffling eliminates unpleasant exhaust noise, in keeping with an industry and operator campaign for quieter and more efficient working areas!

BALANCED

Operator and industry alike benefit from the streamlined and well-balanced 5080 Impactool, when operator fatigue comes down, efficiency goes up.

COMFORTABLE

Comfort counts on production lines, so we've molded the handle of the 5080 to fit the hand. The convenient, easy to operate trigger is located for top comfort and control. When nuts must be run and removed, the easy to grip reverse cap speeds operation.

STURDY

Heavy duty gearing, the proven Ingersoll-Rand Impact Unit, and a sturdy motor keep the 5080 on the job—the only place any tool will pay its way!

POWERFUL

Powered by a long-life Multi-Vane air motor with extra wide vanes, the 5080 takes the tough jobs in its stride, making it first for power and dependability.

Offers a Complete Line of Air and Electric Impactools
up to 4" bolt size capacity

Ingersoll-Rand

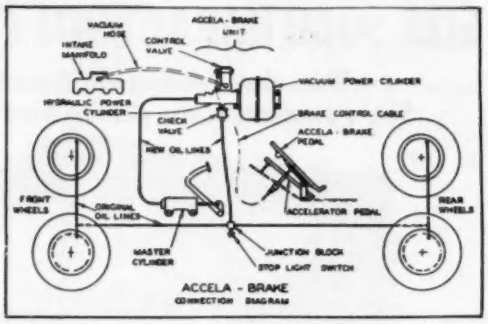
11 BROADWAY, NEW YORK 4, N. Y.

808-S

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 118)



Accela-Brake braking system.

Brake Pedal Unit

Controlled from the accelerator pedal, a recently introduced brake pedal unit may be installed on any car that is equipped with hydraulic brakes. The device consists of a self-contained vacuum-hydraulic power unit that may be placed in any convenient location under the hood of the car by four bolts and a foot-size treadle that is installed over the present accelerator pedal without disturbing the present pedal or its linkage.

The above two units are connected by a flexible control cable that transmits the movement of the foot pedal to the control mechanism of the vacuum-hydraulic power unit under the hood, which in turn actuates the car's regular braking system.

In operation, the Accela-Brake, as the unit is called, is depressed to start the vehicle in motion and raised to slow up or stop the car. The driver raises his toe to slow up and continues raising it until he comes to a complete stop, if desired. After the toe of the pedal has raised to the neutral point of the standard accelerator, the car will coast, and if the foot were completely removed from the pedal, it would continue to coast; but, when the weight of the foot is left on the pedal and the toe is raised above the coasting point, brakes are applied automatically proportionately to the amount that the toe is raised. Raising the toe just slightly above the coasting point gives a soft braking action. It is possible by raising the toe a little farther to obtain fast stops. *Accela-Brake Sales Co.*

Circle P-11 on page 65 for more data

Synthetic Clear Enamel

A synthetic clear enamel for use in the protection of chrome plate systems has been brought out. Introduced under the trade-name Rust-Chek, the product is presently available in five separate formulas, designed for either high, medium or low baking schedules. Hand spray, electrostatic spray or dipping methods can be accommodated.

The line has been engineered to compensate for the lack of nickel available for civilian end products

(*Turn to page* 122, *please*)

VULCAN has the special coated fabric DIAPHRAGMS

FOR AUTOMOTIVE AND AIRCRAFT CONTROLS

Wherever component design requires actuating diaphragms or synthetic rubber coated fabrics having special properties, VULCAN has the knowledge and facilities to solve the problem.

Leading equipment manufacturers choose VULCAN diaphragms and fabrics for such applications as

- Fuel Pumps
- Carburetors
- Instrument Diaphragms
- Dashpot Mechanisms
- Vacuum Booster Pumps
- Fuel Metering Controls
- Hydraulic and Pneumatic Control Mechanisms

Fabrics available in a wide range of specifications as to base fabric, gauge and properties of coatings. Highly resistant to gasoline, oils, aromatics, alcohols, butane, propane and solvents. High heat and cold resistance.

Bring us your problems. Our engineers will work with yours. Write for literature.

VULCAN RUBBER

PRODUCTS, INCORPORATED

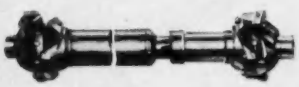
58th Street and First Avenue • Brooklyn 20, N. Y.

The Correct JOINT for Every Industry and Type of Application

for Airplanes

for Automobiles

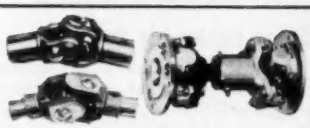
for Trucks



for Crawler Tractors

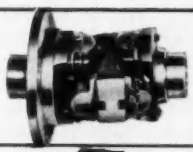
for Farm Machines

for Farm Tractors

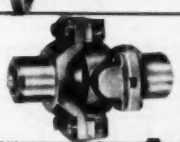


for Helicopters

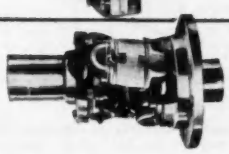
for Construction Equipment



for Road Machines



for Mining Machinery



for Material Handling Equipment

MECHANICS *Roller Bearing* UNIVERSAL JOINTS

For Cars, Trucks, Tractors, Farm Implements, Road Machinery, Industrial Equipment, Aircraft

We make only *Roller Bearing* universal joints. Sizes range from 200 to 50,000 foot pounds torque, with a wide variety of end fittings and shaft arrangements. Practical design, close-tolerance machining and controlled-grain metals assure smooth running joints and long, trouble-free service. For information about MECHANICS Roller Bearing UNIVERSAL JOINTS, write—

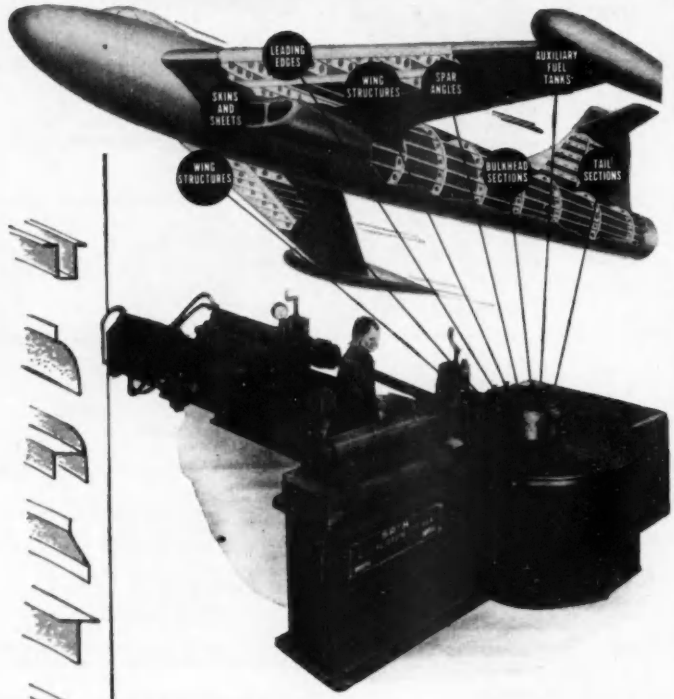
MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

LEADING AIRCRAFT MANUFACTURERS ARE BUYING

BATH RADIAL DRAW CONTOUR FORMERS



AIRCRAFT FUSELAGE AND JET ENGINE COMPONENTS IN PRODUCTION QUANTITIES ... FAST AND ACCURATE!

The versatility of the Bath Radial Draw Contour Former makes it a natural for forming aircraft fuselage, jet engine and guided missile parts. Stretch and compression formed, the parts pass rigid inspection. Cross sections of roll-formed and extruded parts as shown at left, are faithfully maintained throughout varied bends.

The performance range extends from shallow bends in formed strip stock and sharp bends in flanged extrusions to full circles and spirals in metals from 24ST aluminum to titanium of 95% purity.

Machine capacities from 12½ to 200 tons in standard Models. Write for catalog CF-352.

THE CYRIL BATH COMPANY

Manufacturers of Metal Forming Machinery

6915 MACHINERY AVENUE • CLEVELAND 3, OHIO

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 120)

such as automotive chrome plate. When Rust-Chek is applied over scant chrome plating minus the usual nickel coat, the plating is said to give long-term protection from rust and peeling.

All salt-spray and humidity tests of Rust-Chek, as well as year-long Florida exposure tests, have proven satisfactory. *Rinshed-Mason Co.*

Circle P-12 on page 65 for more data

Brake Lining

Strands of asbestos web saturated and completely surrounded with a special frictional binder material are being used for the recently brought-out Rusco Fused Fabric brake lining. This mass is compressed under 300 tons of pressure, effecting a density of 120 lb per cu ft, with a high tensile strength, according to the maker. This is said to result in a brake lining with uniform structure, uniform coefficient of friction and with uniform rate of wear. *Russell Mfg. Co.*

Circle P-13 on page 65 for more data

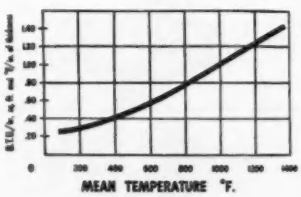
Heat-Resistant Fiber

A ceramic fiber, said to possess unusual heat resistance and electrical properties, has been announced. Trademarked Fiberfrax, it reportedly can be used immediately in combination with, or as a replacement for, asbestos in many applications.

Other applications claimed for the fiber are: filter for gases and liquids in chemical operations; vibration dampening; packing material for expansion joints; and reinforcing agent in electrical insulators and plastic laminates. *Carborundum Co.*

Circle P-14 on page 65 for more data

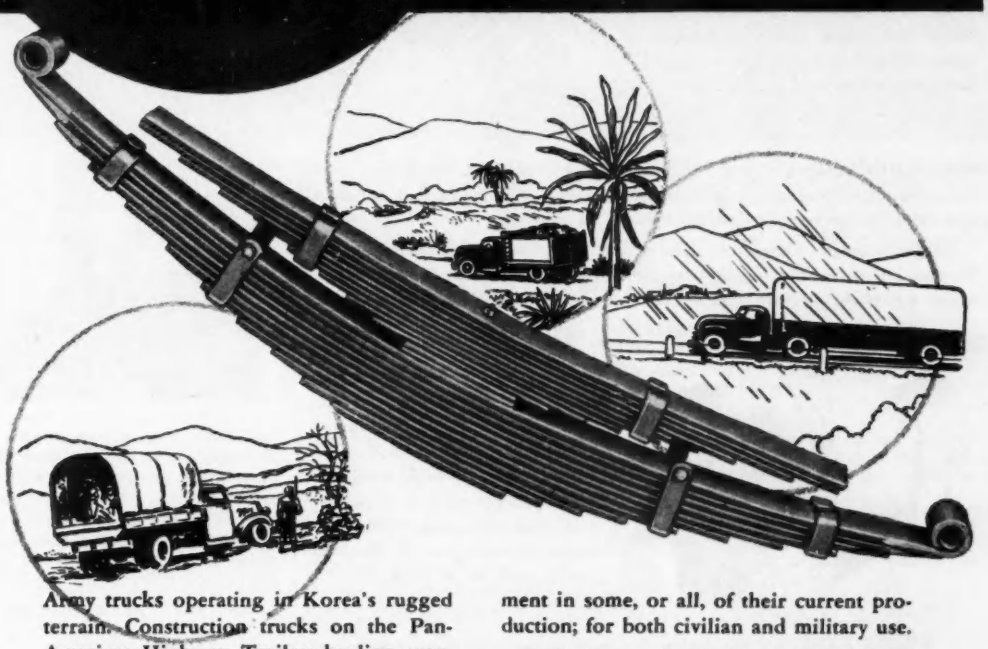
(*Turn to page* 124, *please*)



Thermal conductivity of Fiberfrax refractory at six 161 cu ft density.

DSP

ON TRUCKS—THE WORLD OVER—THE TOUGHEST JOBS PROVE THESE SPRINGS CAN "TAKE IT"



Army trucks operating in Korea's rugged terrain. Construction trucks on the Pan-American Highway. Trailers hauling enormous payloads from coast to coast in our own country.

On much of this equipment, springs, engineered to stand the punishment of the most demanding conditions, are supplied by DSP. Makers of America's heavy trucks use DSP Leaf Springs as original equipment in some, or all, of their current production; for both civilian and military use.

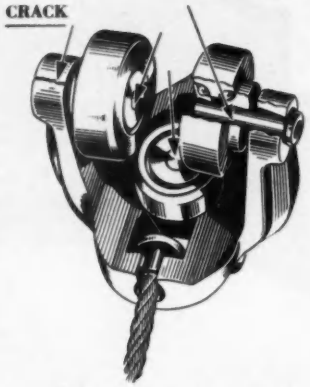
DSP's Automotive Division *SPECIALIZES* in this most important product . . . with its engineering, research, and production facilities directed toward one objective—the design and production of better leaf springs.

Since 1904... ORIGINAL EQUIPMENT ON CARS, TRUCKS, CABS, BUSES, TRAILERS

Fastener Problem of the Month

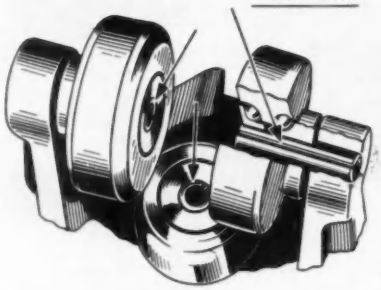
Conveyor roller unit **September, 1952**

PROBLEM: A crack loss ratio of 35 per cent (see arm of casting on the right) was a serious problem to the Williams Machine Company, using pressed fit pins to fasten wheels to a casting in individual roller units of their "Wil-Mac" conveyors. Assembly called for an expensive, time-consuming reaming operation. The need for production economies, plus maintenance and repair considerations, dictated the need for a more satisfactory fastening method.



SOLUTION: Rollpin was the answer to cracked castings. Chamfered ends insure easy insertion and the inherent spring action of Rollpin's slotted, hollow cylindrical design relieves destructive insertion pressures.

Rollpin is simply driven into holes drilled to normal production tolerances. No reaming or peening is necessary. Because it compresses as driven, Rollpin exerts a constant pressure against hole walls which makes it self-locking and vibration-proof.



Williams reports a saving of 30 per cent in roller unit manufacturing costs—and a considerable saving in maintenance and repair, since Rollpin is easily removed with a drift or pin punch, and can be reused. In this same unit, Rollpin is also used as a stop for the drag wire and as a shaft for the hangar.

WRITE ESNA for the design information you'll need to solve your next fastening problem.

ROLLPIN TRADEMARK

Dept. R12-95, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free information:

☐ Rollpin bulletin and samples
☐ Elastic Stop Nut Bulletin
☐ Here is a drawing of our product. What fastener would you suggest?

Name ..... Title .....
Firm .....
Street .....
City ..... Zone ..... State .....

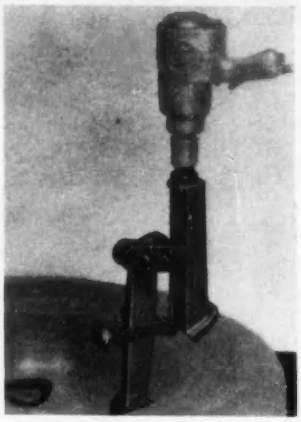
New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 122)

Truck Tire Remover

Model 860-C universal truck tire remover can be operated by hand or impact wrench, according to a recent announcement from the maker. A hex nut on the bead driver permits the use of electric or air wrenches to speed up and simplify removal of badly frozen tires.



The tool has accessories with a total of four possible combinations to remove truck and bus tires from different types of rims. It can also be used as a bead breaker on two-piece, semi-drop center rims such as used on many ¾-ton trucks. *Bishman Manufacturing Co.*

Circle P-15 on page 65 for more data

Iron and Steel Finish

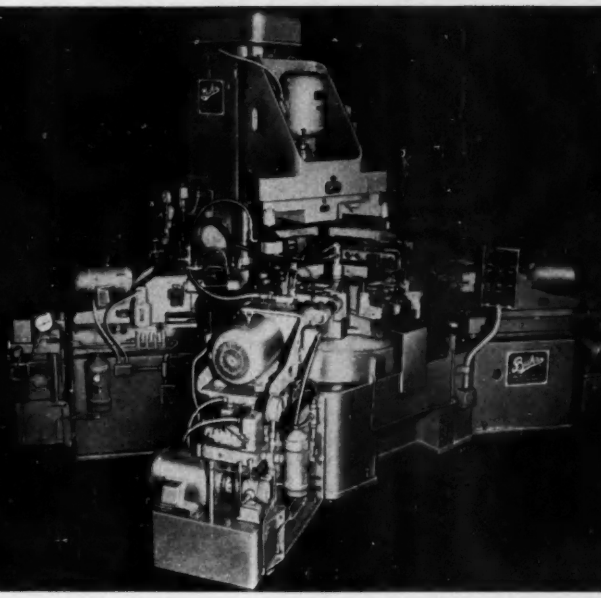
Now available under the name Parco Black is a jet black finish, used in water solution at low temperatures, for iron and steel.

Parts to be treated are immersed for 15 to 30 min in the processing bath, then are rinsed and dried. After oiling or waxing, the deep black, durable finish is ready for service.

Any ferrous part which can be immersed in the tank can be treated. It is reported entirely suitable for machined or threaded parts. *Parker Rust Proof Co.*

Circle P-16 on page 65 for more data

WHY DOAKES GETS FROM BANFF TO TALLAHASSEE



What are the travel and automobile agencies reporting every season? . . . That Joe Doakes—the typical American—is taking more vacation and traveling farther year after year . . . And here's one of the reasons why—this Buhr Five-Way Horizontal-and-Vertical Hydraulic-Feed Drilling Machine . . . the Machine which one of the world's leading Auto Makers uses "around the clock" for producing Rocker Arms in such volume and at such low cost that . . . Joe Doakes may afford to drive thousands of miles for vacations—literally from Banff in west Canada to Tallahassee, Fla.

Auto Maker Chooses This to Turn Out 880 Pieces an Hour for Utmost Economy

As each new model comes off the auto assembly lines, the battle to cut production costs becomes more intense. Not long ago, one of the big auto companies concentrated on how to make a certain rocker arm most economically.

Here Was Their Problem

To secure a piece of production equipment which would perform 7 operations on the rocker arm, including tapping, drilling, endmilling, chamfering and spotfacing—that was the problem.

As the company to design and manufacture the Special Machinery to solve this problem, they chose Buhr.

What the Machine Does

In general—it drills 8 holes, drills through 4 more holes, taps 4 holes, endmills 4 places, spotfaces 4 places and chamfers 4 previously drilled holes. It is equipped with 42" automatic Index Table and six-station Holding Fixture, loading four parts per station. Parts are automatically clamped while fixture moves from loading position into first working station, and are automatically unclamped while Fixture moves from last working station to unloading.

Specifically, the Machine does this—

Station 1—Load and Unload

Station 2—Vertical, idles; Horizontal, taps and drills (4) 7/16-20 holes

Station 3—Vertical, endmills (4) 1/2" Radius places; Horizontal, chamfers (4) previously drilled holes

Station 4—Vertical, drills (4) 1/8" dia. holes 3/16" deep; Horizontal, idles

Station 5—Vertical, drills (4) 3/32" dia. holes through; Horizontal, spotfaces (4) 15/16" dia. places

Station 6—Vertical, idles; Horizontal, taps (4) 7/16-20" S.A.E. holes

PRODUCTION—880 pieces per hour at 100% efficiency.

Why Buhr Was Called In

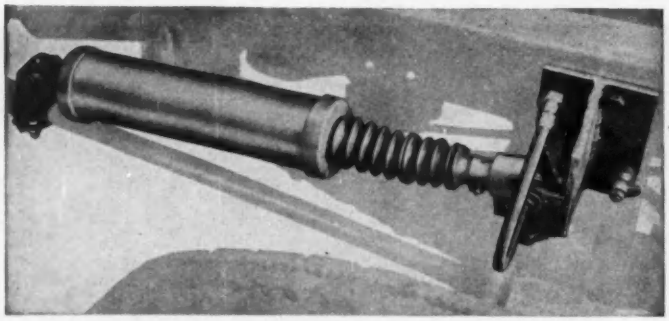
Leading Automobile Manufacturers have done business with Buhr for more than a quarter-century. . . . They know Buhr's record for dependable Special Machinery . . . and for delivering on time. . . . They're familiar also with Buhr's excellent manufacturing facilities . . . and their experienced, trustworthy and specialized sales and engineering staffs. Consequently . . . for Special Machinery like this . . . it is second-nature for them to call Buhr.

For Details About Buhr

A comprehensive Catalog . . . or a personal call from a Buhr Sales Engineer . . . is yours for the asking wherever you are located in the United States! . . . For every problem involving this type of Special Machinery—including the type which helps Joe Doakes get from Banff to Tallahassee—phone, wire or write us.

BUHR MACHINE TOOL CO.
Ann Arbor, Michigan
Phone: Ann Arbor 2-5646—5980
Detroit WOodward 3-2126

Buhr ***SPECIAL MACHINERY . . . Leaders Make Sure with BUHR***



Air-O-Matic Power Steer Booster installed on White Truck Model 302264

AIR-O-MATIC *AIR POWER STEERING*

for

SAFE STEERING ASSIST

A self-contained unit, easily installed. Only one air line required.
Low initial cost and maintenance.
Used by manufacturers of trucks, tractors, Moto-Cranes, off-the-road equipment, Military and other vehicles.
Technical information furnished upon request.

AIR-O-MATIC POWER STEER CORP.
24 Noble Court N. W. Cleveland 13, Ohio

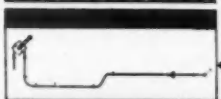
TELEFLEX

MECHANICAL REMOTE CONTROLS

UNLIMITED ROTARY MOTION—The meshing of the screw-type flexible Cable and the specially hobbed gear of the Teleflex Control Box allows unlimited rotary motion.

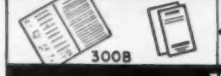
EFFICIENCY—The unique construction of Teleflex Cable permits Teleflex Controls to operate efficiently in both tension and compression.

MINIMUM LOST MOTION—The close tolerance held between Teleflex Conduit and Cable reduces snaking of the Cable within the Conduit.



FLEXIBILITY—Conduit and Cable can be routed around obstructions and through areas where space is limited.

EASE OF INSTALLATION—Teleflex controls are assembled at point of installation from standard Teleflex parts. Prefabricated controls also are available.



For further information write for Catalog 300B. Engineering data for calculating operating loads and backlash is available also.

TELEFLEX INCORPORATED
125 S. Main Street
North Wales, Pa.

News of the

MACHINERY INDUSTRIES

(*Continued from page* 57)

fense authorities have changed, Raterman said, "We have had some cancellations of this type, but they have been so minor that even with an 80 per cent increase in the first half shipments of 1952, over the comparable 1951 period, our backlog remains virtually unchanged at $30,000,000. While our earnings also have increased, they have not kept up with these expanded shipments due to the higher tax rates.

"It is impossible, of course, to predict with any assurance just how long the demand for our machines created by the defense effort will continue. The present outlook, however, is that for another twelve months, at least, we shall be called upon to deliver every machine it is within our capacity to produce."

New Production Method

Seneca Falls Machine Co. has developed a new production method which is said to be a distinct step forward in handling work from machine to machine. Already the firm has received an order from one of the leading automobile producers for two batteries of Seneca automatic turning equipment serviced by the new automatic handling and transferring method.

According to E. R. Smith, president of Seneca Falls, the loading mechanism of the machine is so arranged that the machine proper is not encumbered. This system makes it possible for all regular attachments, such as steady rests, overhead slides, etc., to be used the same as on a manually loaded machine.

With the new mechanism, rough stock can be delivered at one end of the line and carried through various machining operations without manual labor. After each operation, work is automatically gaged and if any dimension is not within prescribed tolerances, lights indicate the faulty dimension.

Foreign Producers Eye U. S. Markets

Once again the foreign tool builder is looking toward the U. S. dollar. This is claimed to be particularly true of foreign companies intending to exhibit products at the Second European Machine Tool Show to be held in Hanover, Germany, September 14th to

(*Turn to page* 128, *please*)

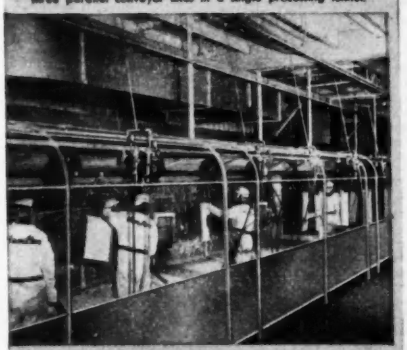
COMPLETE SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Complete Mahon Finishing System Installed on the Roof of the Hamilton Manufacturing Company's Plant. Note Conveyor Tunnels Extending Across the Roofs of Buildings to Fabricating and Assembly Areas.

Mahon Six-Stage Metal Cleaning and Rust Proofing Machine. This is the first machine of this type built to accommodate three parallel conveyor lines in a single processing tunnel.



Mahon Hydro-Filter Spray Booth 87 ft. long. This is one of four Spray Booths in the Complete Mahon System at Hamilton Manufacturing Company, Two Rivers, Wisconsin.

Modern, Self-Housed Mahon Finishing System Installed on Roof Saves Floor Space at Hamilton!

Illustrated here you see a Complete, Self-Housed Mahon Finishing System built on the roof of the Hamilton Manufacturing Company's plant to conserve manufacturing floor space. Parts are processed on three separate conveyor lines, the longest of which is approximately one-half mile in length and requires four hours for a complete circuit at a conveyor speed of 10 feet per minute. This is an excellent example of Mahon planning and engineering in close cooperation with Hamilton executives. If you are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to determine your requirements and to do the all-important planning which is the key to high quality results in production finishing. Over thirty years of experience in planning, engineering, building and installing thousands of finishing systems of every type and size, for virtually every industry, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. In the automotive field and the home appliance field, where fine finish is imperative, you will find more Mahon Finishing Systems than all other types combined. See Sweet's Mechanical Industries File for complete information, or write for Catalog No. A-653.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-Off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Hydro-Foam Dust Collectors, Dust Traps, Fog-Filters, and other units of Special Production Equipment.

MAHON

Moly-sulfide
A LITTLE DOES A LOT

shows up best where the frictional conditions are difficult

The case-histories of 154 difficult friction problems in the shop and in the field, all successfully solved, are described in a new 40 page booklet.

It is where conditions are extreme that ***Moly-sulfide*** excels over other lubricants. If you encounter extreme conditions of pressure, temperature or velocity, send for this free booklet.

Climax Molybdenum Company
500 Fifth Avenue
New York City 36 N Y

Please send me your Free Booklet

Name.....
Position.....
Company.....
Address.....

MOLY

AI9 MS-9

News of the MACHINERY INDUSTRIES

(*Continued from page* 126)

23rd. Report has it that foreign machine designs will be slanted at the American market. Foreign producers are talking in terms of high-speed, high-productivity machine tools that meet this country's production standards. It still remains to be seen, however, whether the foreign tools come up to U. S. industrial power requirements.

The ASTE is sending an official delegate to both the Hanover show and the International Machine Tool Show to be held in London, September 17th to October 4th. This delegate, Joseph P. Crosby, vice president of Lapointe Machine Tool Co., and 2nd vice president of the ASTE, will no doubt bring back many interesting notes on the foreign machine situation.

Errata

The capacity range of the Lake Erie travelling-head straightening press, item E-14 AUTOMOTIVE INDUSTRIES, August 1, was published incorrectly. It should have read "from 200 to 2000 tons."

BOOKS . . .

HANDBOOK OF ENGINEERING FUNDAMENTALS, Second Edition, *edited by Ovid S. Eshbach, published by John Wiley & Sons, Inc.* This second edition, edited by the same author, follows closely the pattern of the first edition which appeared in 1936, represents changes and revisions to incorporate new information, improved methods of presentation, and changes in emphasis in the light of existing knowledge. One of the major objectives of the handbook is to provide a ready reference to the basic ideas of applied science and mathematics for students and practitioners alike. It presents the subject matter in 14 chapters, including mathematics, mechanics, fluids, aerodynamics, thermodynamics, electricity and magnetism, radiation, chemistry, materials, and engineering law. Revision and review of major subjects covered here was undertaken by an impressive staff of specialists in the various branches of science.

MODERN ARC WELDING, *published by Hobart Trade School, Troy, Ohio. Price, $3.00.* This new 544-page book makes available a comprehensive and practical textbook on the procedure and practice of arc welding. Clearly written, the 28 chapters are divided in five parts. The book is illustrated with over 600 photographs of operations, diagrams, and charts.

WITTEK

NOC-OUT HOSE CLAMPS

The Standard of the Automotive Industry

Type A—Radiator Hose Connections

Type G-BB—Booster Brake Hose Connections No. G-B-HH for Hot Water Heater Hose

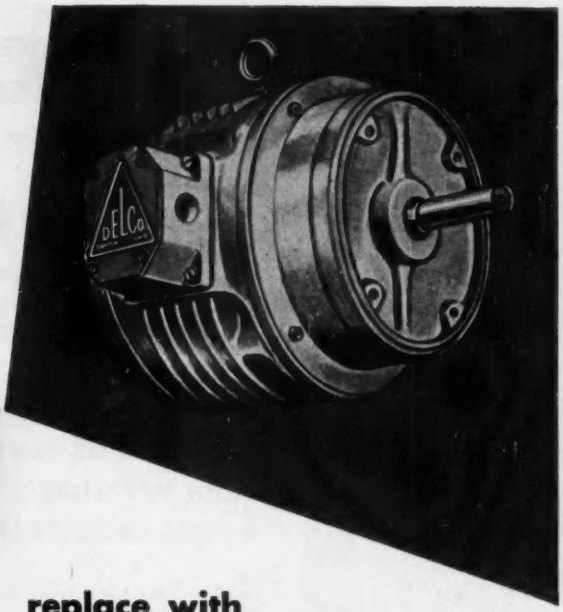
Type HP—High Pressure Hose Connections

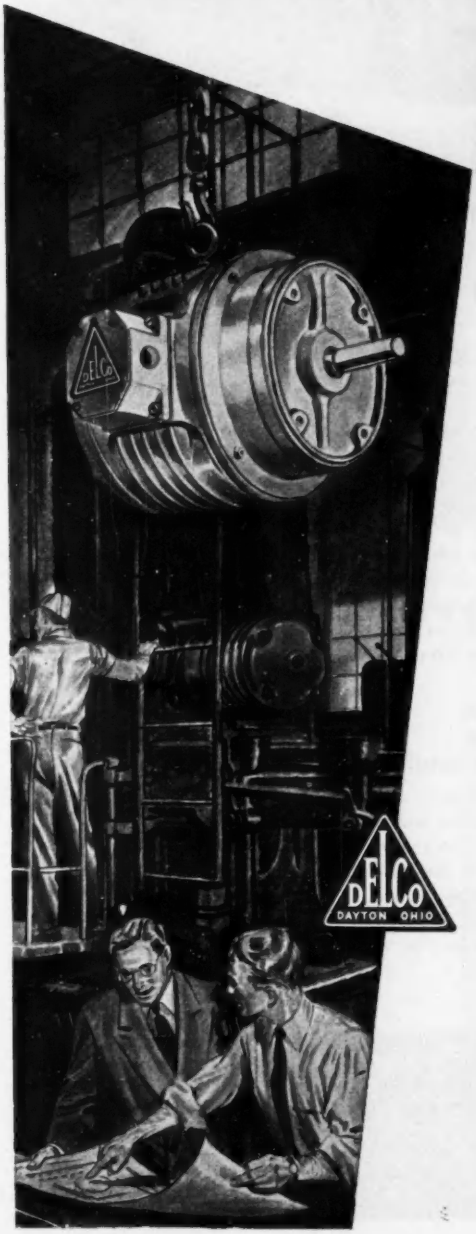
Wittek Noc-Out Hose Clamps are designed in a variety of types made in many sizes for use by the automotive industry. Because they provide the most practical leakproof hose connection, they are specified by the leading manufacturers as standard, original equipment for automobiles, buses, trucks and tractors.

Write for descriptive literature.

Automotive HOSE CLAMPS
WITTEK MANUFACTURING CO.
4319 W. 24th Place, Chicago 23, Ill.
Dependability in Hose Clamps for Over a Quarter of a Century

Those in the know...





replace with

DELCO MOTORS

When motor replacements are needed—fast—it's a great satisfaction to be able to *reach for a name.* A name like *Delco.*

Those who know their integral motors—master mechanics, electrical engineers, plant engineers—know that the name *Delco* identifies integral motors that *exceed* industry standards in matters of performance, dependability and long life.

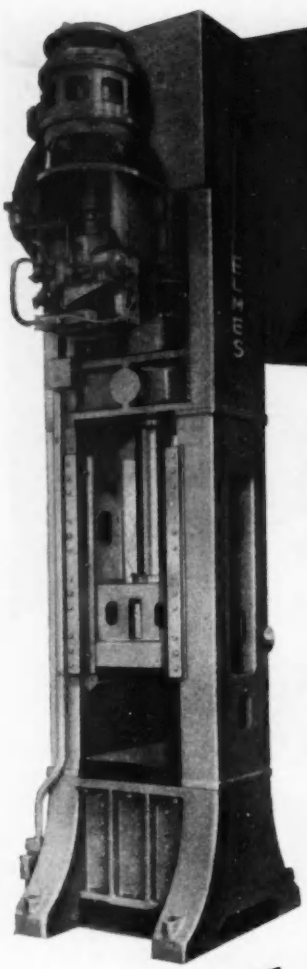
THERE'S A DELCO FOR PRACTICALLY ANY INDUSTRIAL APPLICATION

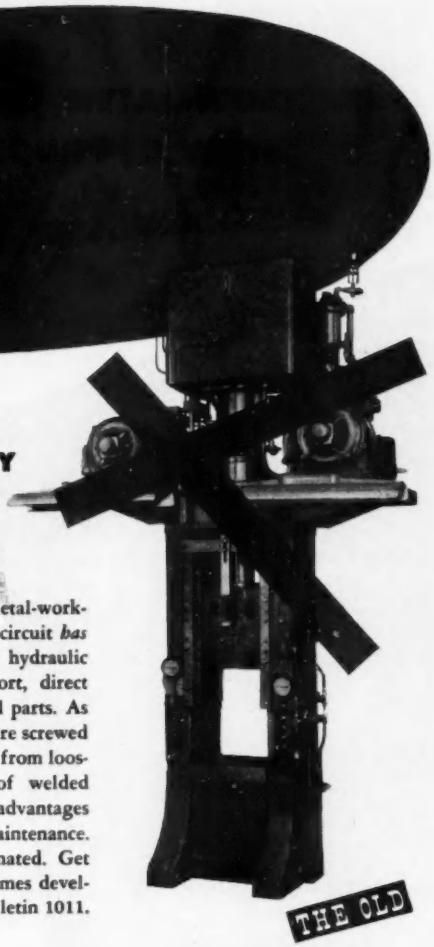
Open and closed motors up to 100 h.p. for standard foot mountings. NEMA C&D flange-mounted motors up to 30 h.p. Available through local Delco motors distributors.

DELCO PRODUCTS

Division of General Motors Corporation
Dayton, Ohio

Available Through Local Delco Motor Distributors





THE OLD

REVOLUTIONARY DESIGN ENDS COSTLY HIGH PRESSURE PIPING TROUBLES!

In Elmes Pipeless Hydraulic Metal-working Presses, the main hydraulic circuit *has no piping!* All high-pressure hydraulic fluid is conducted through short, direct passages drilled in the structural parts. As a result, there are no high-pressure screwed joints to loosen, no oil dripping from loosened fittings, no possibility of welded joints breaking loose. These advantages make for remarkably low-cost maintenance. Downtime is practically eliminated. Get the facts on this outstanding Elmes development now. Write for new Bulletin 1011.

THE NEW

New Elmes Drawing and Forming Press Equipped with Pipeless Hydraulic Circuit

Upper left shows rear view of press. Cutaway view at the left shows front section around cylinder barrel. Note in both views the absence of any piping in the main hydraulic circuit. The only pipes on the entire press are the pilot, suction, and drain lines. Of these, only the pilot line carries high-pressure fluid.

(Above) Drawing and Forming Press with Conventional Hydraulic Circuit

The extensive high pressure piping shown on the press above has long, indirect fluid passages, making for frequent downtime and high maintenance costs. This time and cost burden is practically eliminated by the revolutionary new Elmes pipeless construction.

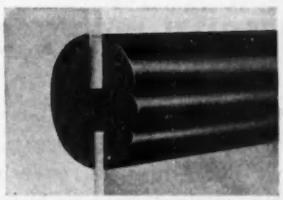
American Steel Foundries

Even down here...you'd be perfectly dry!

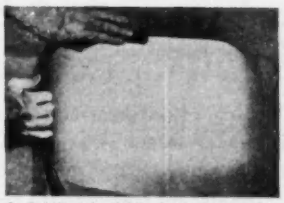
As far as this windshield is concerned, the car could cruise the salty depths, like a submarine. No leaks, in windshield or fixed windows, if they're protected by Inland Self-Sealing Weather Strip. That's due to Inland's *exclusive* principle . . . using the natural resilience of specially compounded rubber, permanently compressed, to effect the seal *without* cement or binders of any kind! It's absolutely leakproof, water-tight and rattle-free!

The first cost of the vehicle can be slashed by using Inland Strip, because installation is a fast, one-man job . . . which also cuts glass-replacement costs for the user. Two *economy* reasons for designing your vehicles to take Inland Self-Sealing Weather Strip.

INLAND MANUFACTURING DIVISION
General Motors Corporation • Dayton, Ohio



1. Cross-section of Inland Weather Strip.

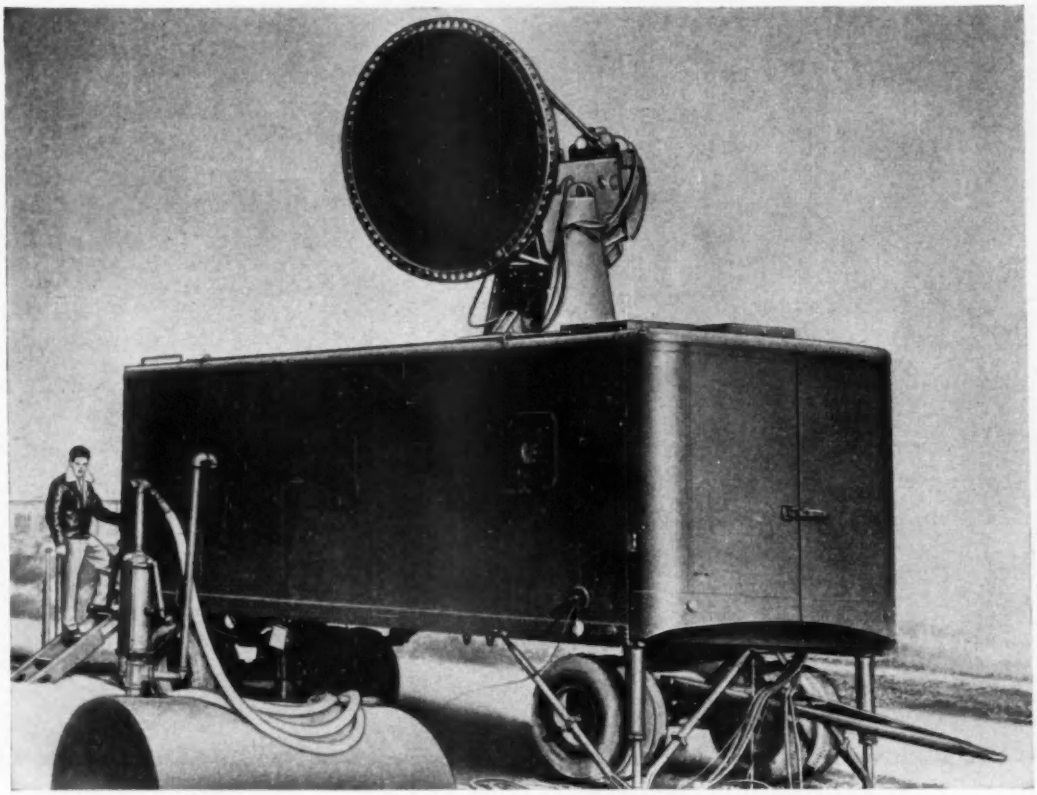


2. Set the Inland Strip in the body panel.

3. Slip the glass into the Inland Strip.

4. Zip the filler strip into the channel.

INLAND MANUFACTURING ***Self-Sealing Weather Strip*** *(PATENTED)*



It takes PRECISION MANUFACTURING to say "HERE THEY COME"

The big, round screen on top of the mobile trailer, is a radar antenna—part of a new fire-control system for anti-aircraft gun batteries.

Details are classified for security reasons. However, many improvements and refinements, make the device more informative, effective and flexible than its predecessors.

We make the radar antenna and the intricate, precision gears that actuate the system, for the Western Electric Company. Gears that must be precise, because gear errors of ten-thousandths of an inch, mean miles in the sky.

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engineers and manufacturers
Springfield, Ohio

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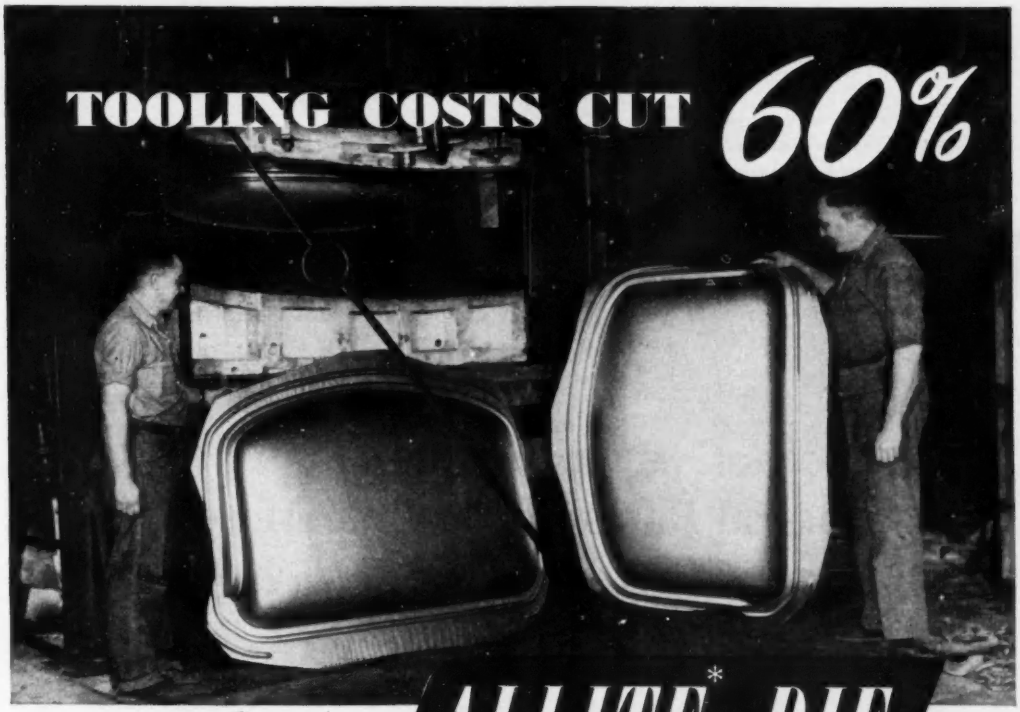

with an ALLITE* DIE

Here is an example of how Allite Dies show worthwhile savings.

A truck manufacturer required approximately 100 experimental roof panels. A three-piece Allite Die was built for the job. This die cost only 40% of what would have been required if an iron die had been used. Of equal importance to the customer, a zinc alloy die such as this is produced quickly, and its accuracy provides the true die conditions and performance that are usual in high production tooling. While nearly 100 stampings were drawn with this particular die, several thousand more could have been produced before any appreciable wear resulted.

If you have need for experimental or short-run dies, it can be to your advantage to give serious consideration to Allite Dies—produced by Richard Brothers Division where plaster pattern, modern foundry, and extensive die shop facilities are fully coordinated. Why not write today for full information.

*ALLITE DIES are accurately cast for low cost tooling. The material used is any formula of zinc alloy (Kirksite, Formaloy, etc.) which meets your requirements.

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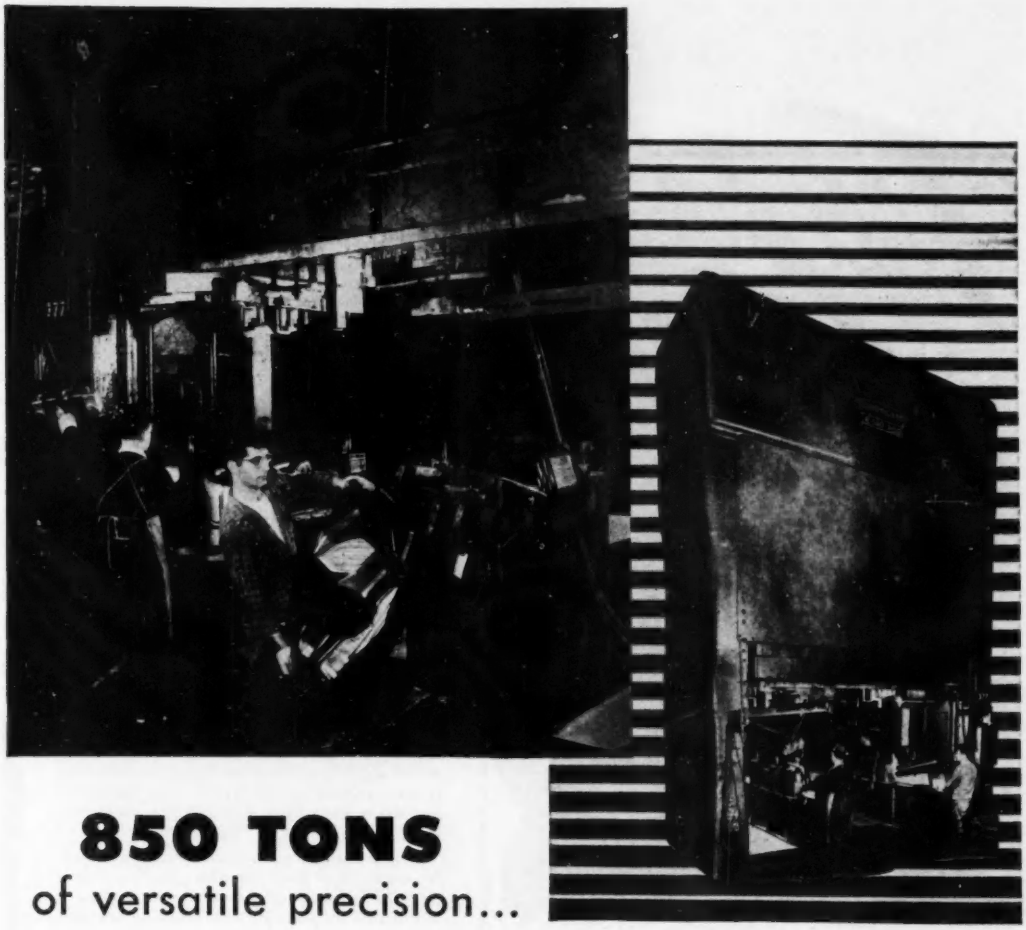

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With over 60% of our total labor force falling outside of farm and factory employment, obviously salesmen on the front line of selling contribute greatly to the productivity, prosperity and the world's highest standard of living enjoyed by the U. S. A.

Without sales a business fails and jobs vanish. No matter how good a product may be, it must be sold in competition with other goods. A salesman sometimes finds his products not truly competitive. He then exercises tremendous pressures on his employer for better products, lower prices, or both. Thus, competitive selling greatly influences the progress of American prosperity.

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Competition, especially competitive selling, is a great American Freedom. Let us preserve it to assure Progress For All Our People.

• • •

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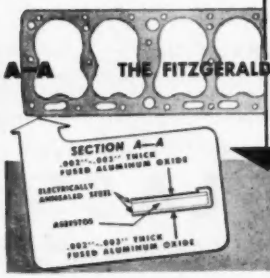

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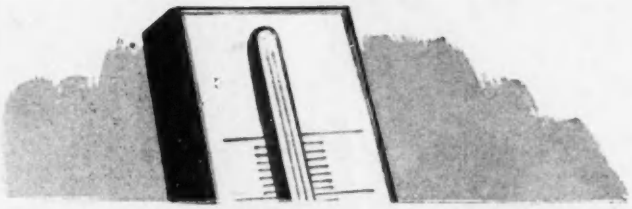
FITZGERALD Gaskets SINCE 1896



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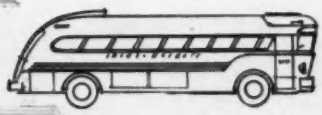
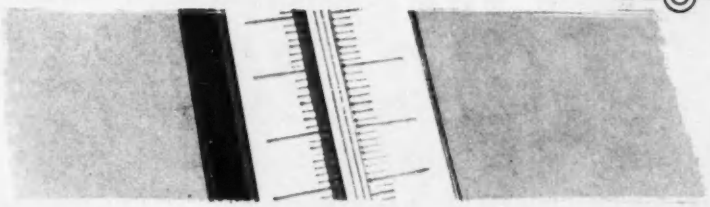
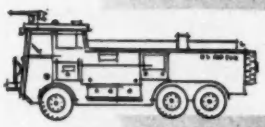
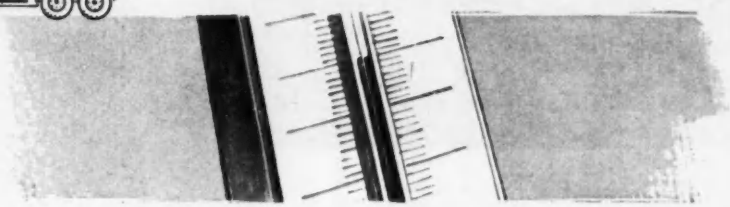


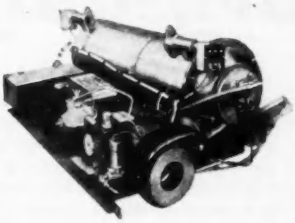




OPERATION ASSURED



with JANITROL LIQUID HEATERS



It's a cold hard fact that *reliable operation in any weather*—right down to 65° below zero—is a tough spec for any vehicle. But it's a requirement that can be met in full with Janitrol liquid heaters—as severe tests have proved repeatedly. On the USAF bomber tow tug built by Euclid Road Machinery Company, for example, positive starting was accomplished without special fuel capsules at –65°F after a 72-hour cold soak, and engine temperature jumped to the 155° to 165°F range well within 60 minutes.

If you're responsible for protecting investments in any vehicles or stationary engines or mobile power plants, gasoline or diesel powered, you'll do well to look into the 6-year long record of Janitrol liquid heater reliability. Your nearest Janitrol representative is always at your service.

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Finger-tip gearshifting for heavy-duty

Allison TORQMATIC Transmission quick-shifts under load at full throttle—saves time—cuts operating and maintenance costs

PERFECT teammate for the famed Allison Torqmatic Converter is this Torqmatic Transmission — an exclusive development that takes the work out of gearshifting in even the largest off-highway trucks and heavy earth-moving vehicles.

Embodying the same basic design principles as the Allison Torqmatic Transmission, which has long been used in U. S. armored vehicles, this Allison quick-shift transmission eliminates "gearshift guess"—puts an end to laborious clutch pedal pumping and the usual manual gearshifting.

Unlike conventional sliding-gear types, the Allison hydraulically controlled *Torqmatic* is a constant-mesh, planetary-gear transmission. With a simple flick of a lever, the driver can shift from one range to another *at full load without taking his foot from the throttle*—and without losing momentum.

A Smooth Power Flow

Coupled with the cushioning effect and automatic features of the Allison Torqmatic Converter, this transmission greatly extends the torque converter's capacity. This means that trucks up to 50-ton pay load can climb steep grades with the smoothness and operating ease you enjoy with an hydraulic transmission in your car. It cuts maintenance. It increases truck life. It reduces operator fatigue. It enables drivers to handle bigger pay loads on faster schedules. *It gets more work done at lower cost per ton-mile.*

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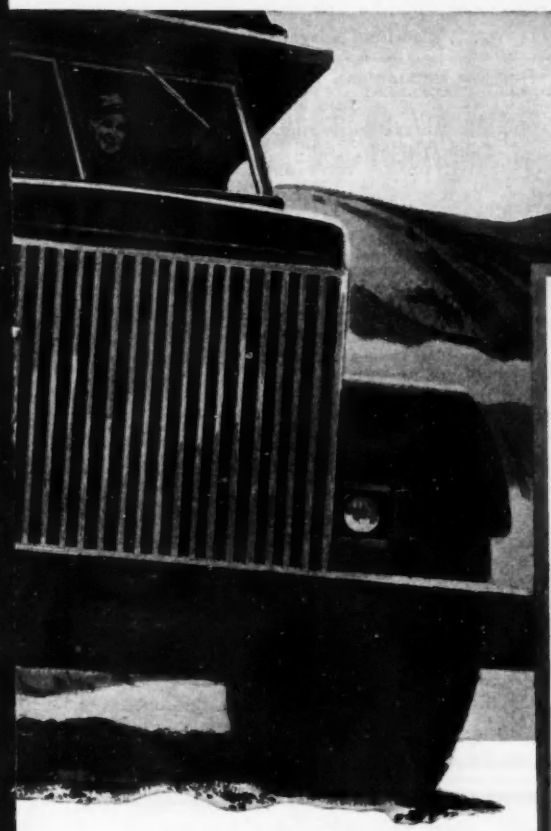

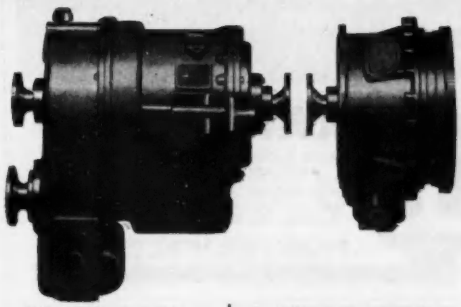

Allison Torqmatic Transmission | **Allison Torqmatic Converter**

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—for maximum operating economy

Quick shifts under load at full throttle

Finger-tip hydraulic gearshift control

Combination needs only three forward speeds with one reverse

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TORQMATIC DRIVES

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SYNCHRO-START PRODUCTS, INC.
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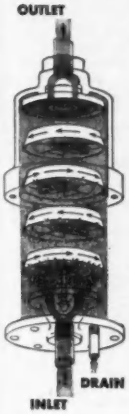

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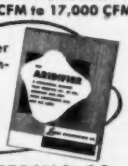

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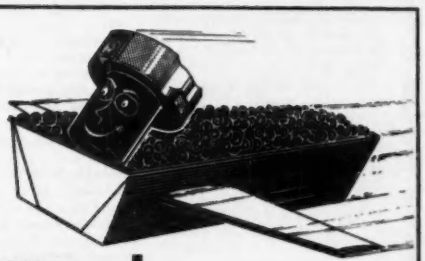

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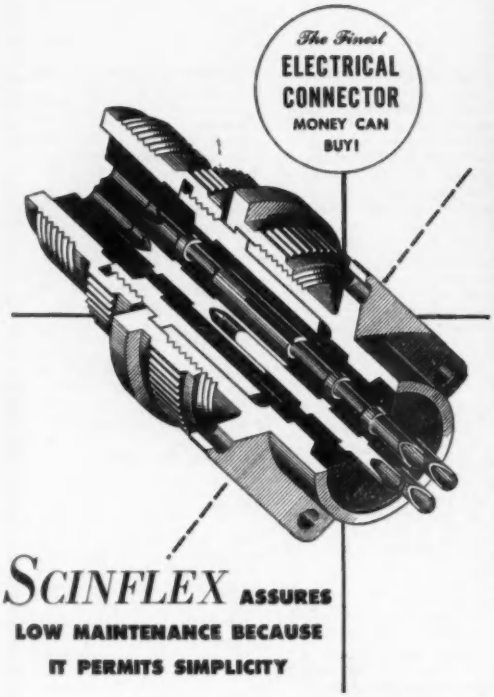

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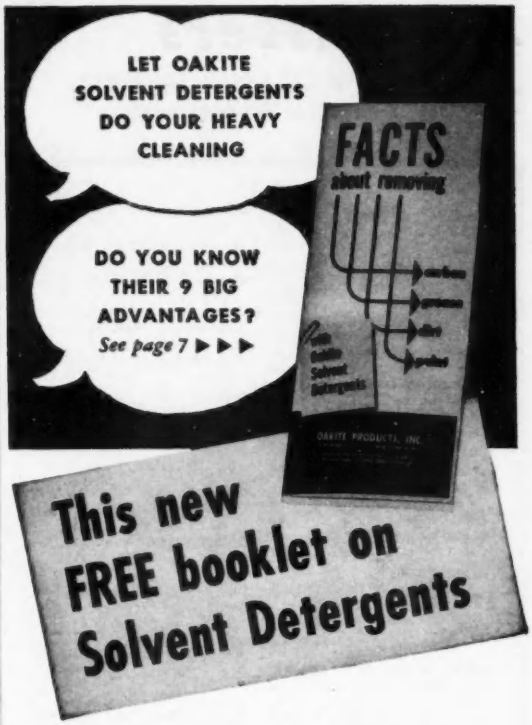

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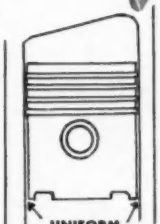

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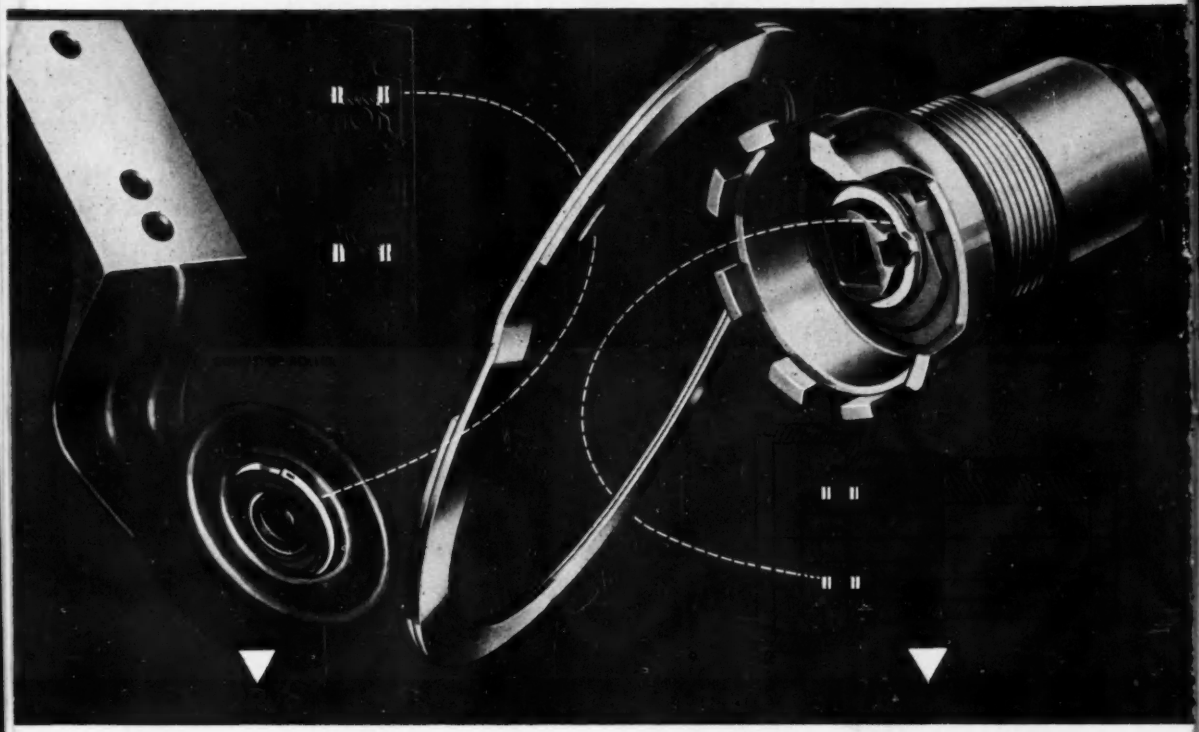

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